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PLOTTER PRINTER HI-80 OPERATING MANUAL

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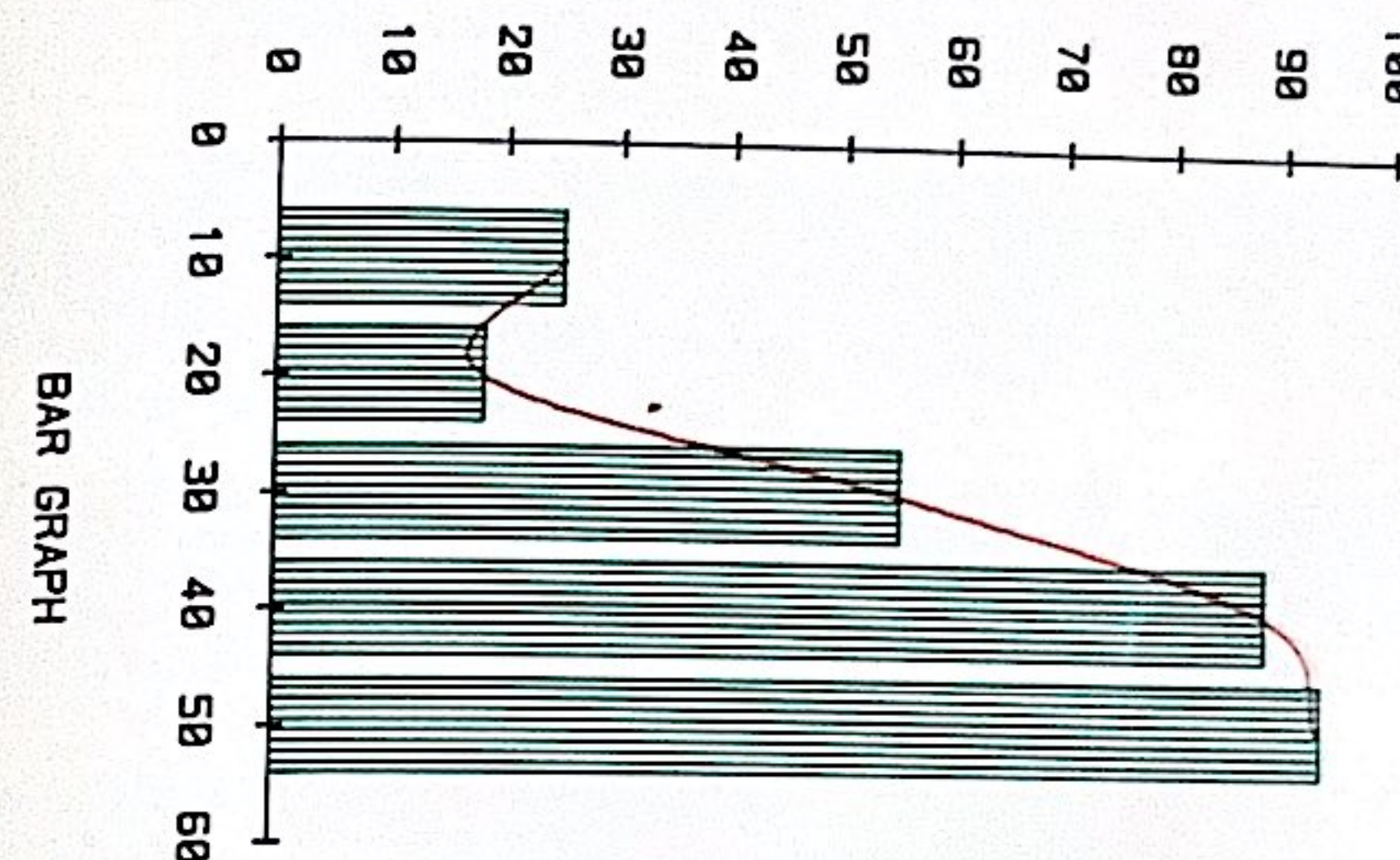
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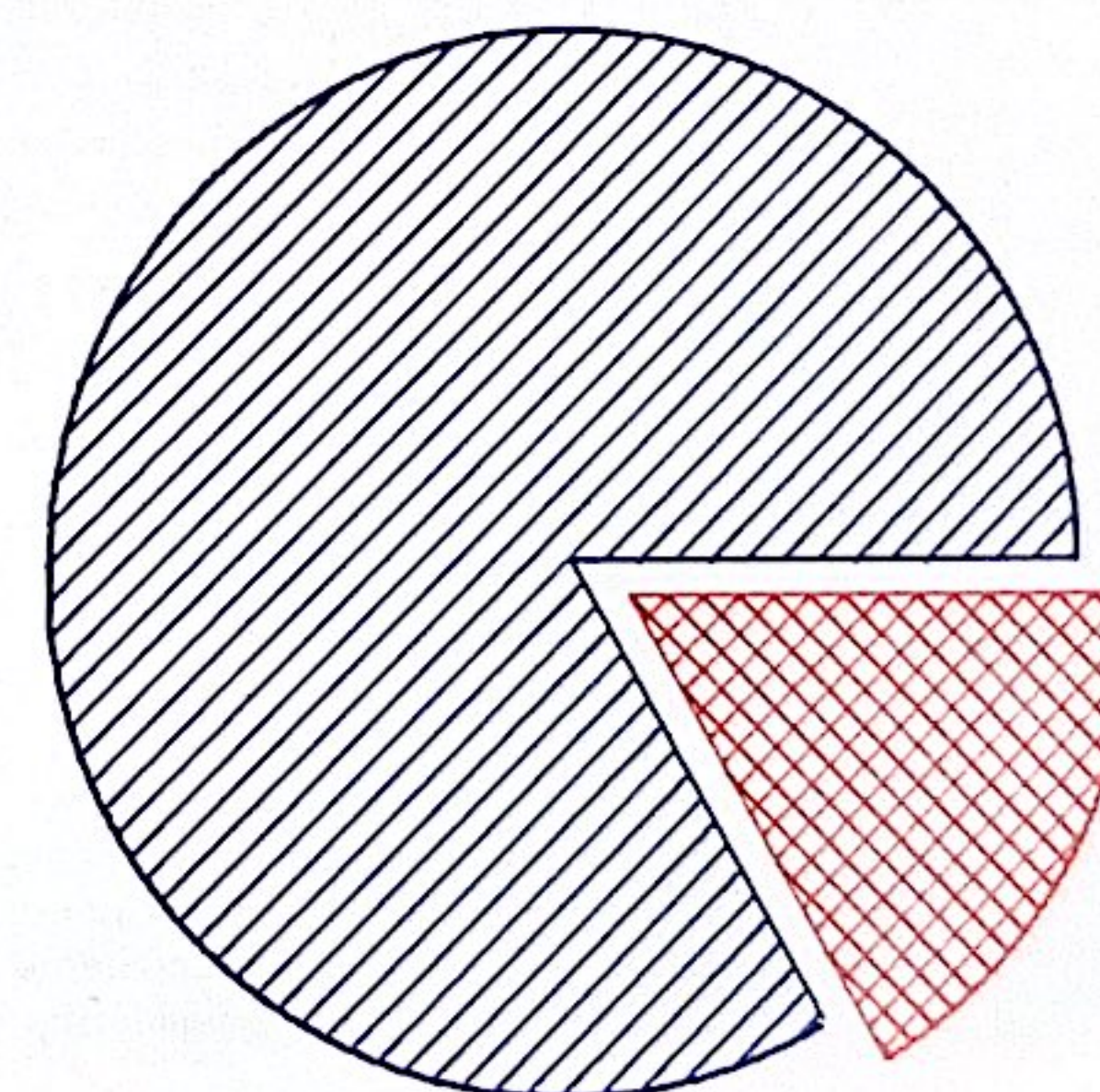
Example of Color Printing (1)

Self-test Pattern

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PIE CHART



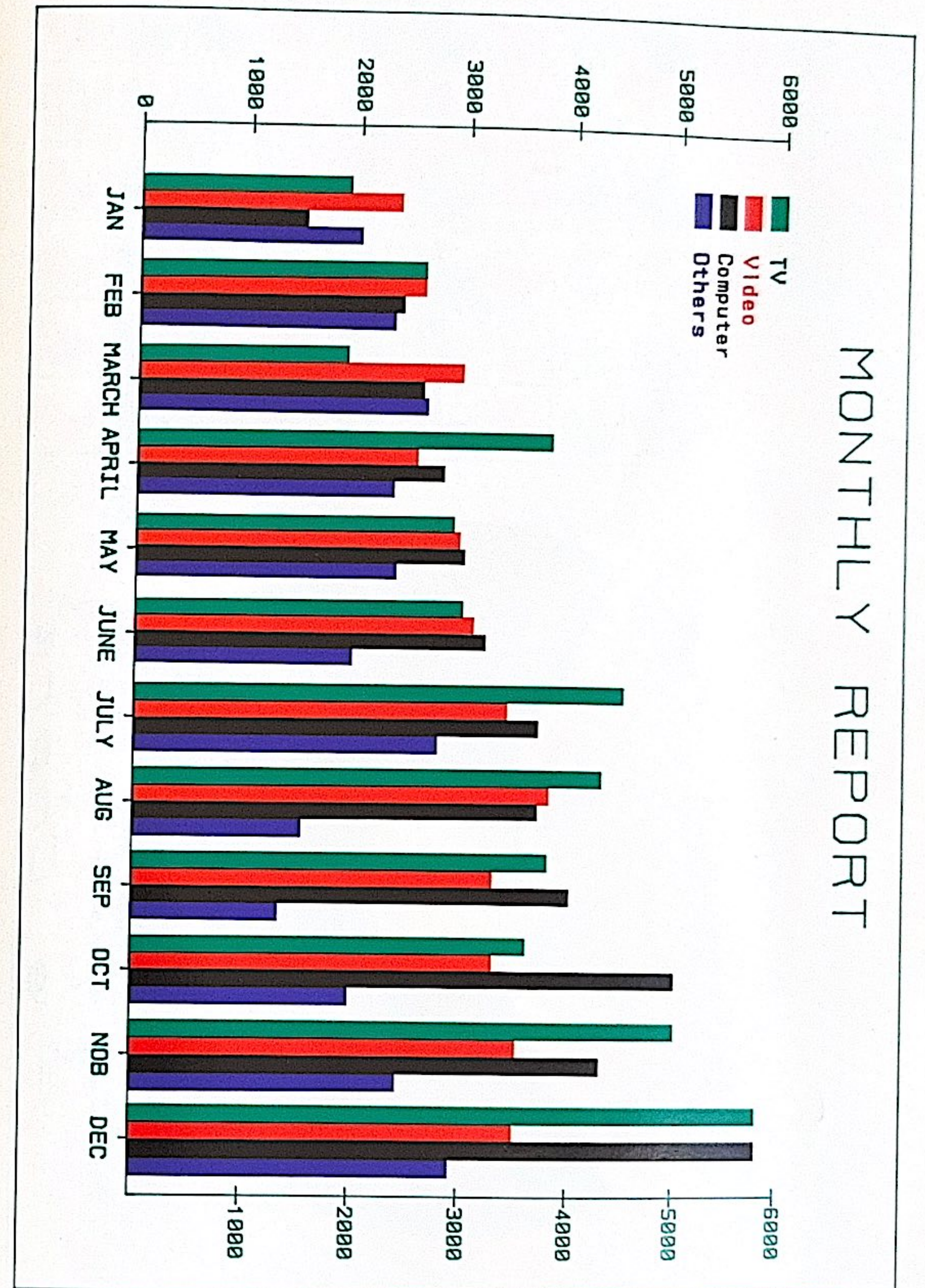
HI-80 VER 1.0 SELF TEST

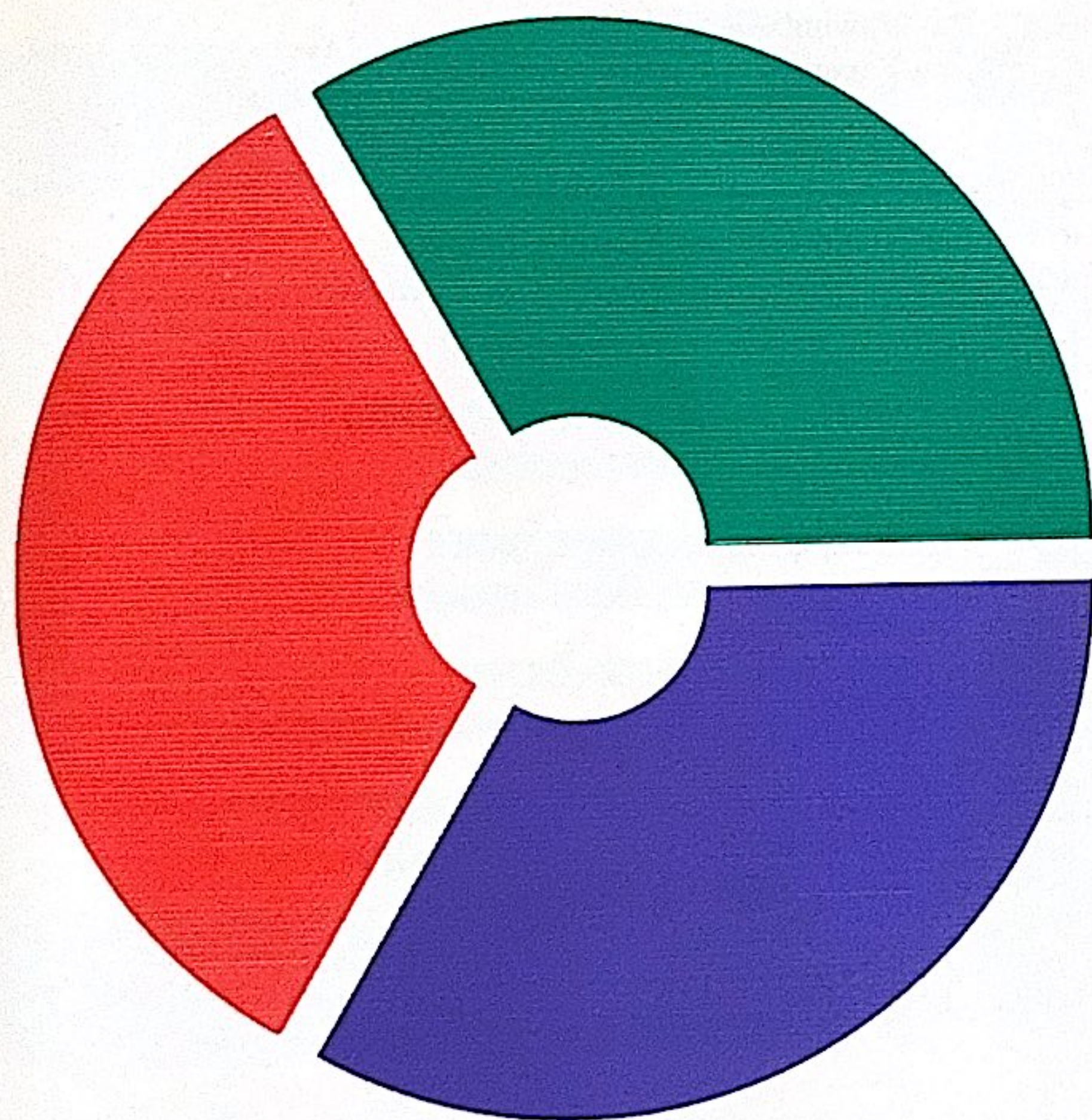
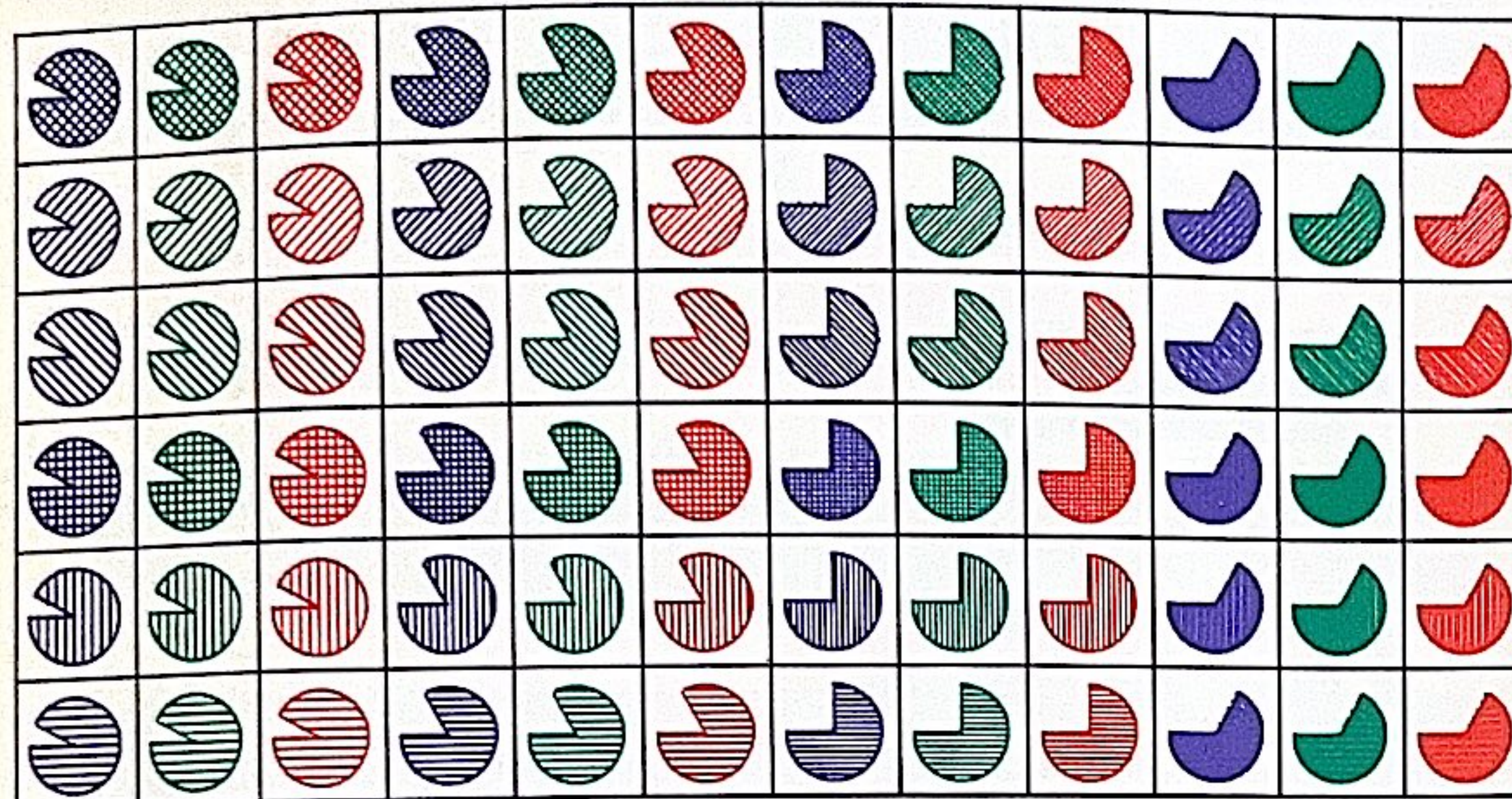
Example of Color Printing (2)

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Example of Color Printing (3)





Pie Chart

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Chapter 5 PLOTTER MODE 1 COMMANDS

Chapter 6 PRINTER MODE COMMANDS

Chapter 7 GENERAL PLOTTING CONCEPTS AND SOME EXAMPLE PROGRAMS

Chapter 8 MAINTENANCE

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WARNING

High voltage exists inside this unit and the case should be opened only by a service person!

INTRODUCTION

The HI-80 is an easy to use plotter printer which has many features and commands not present on plotters costing many times the price. It can be used with any programming language or applications program which produces text output. Applications programs specifically written for use with the HI-80 will also be available as the HI-80 becomes widely available. However, since there are also commands which simulate other plotters, some application software is already available.

The features which the HI-80 offers are:

- The ability to use up to four colour pens at once, with ten colours available altogether.
- Simultaneous substitution of all four pens using an easily replaceable cartridge.
- Three pen types. Fibre tipped pens using oil-based ink for OHP film. Fibre tipped pens and ball-point pens for drawing on paper giving different line thicknesses.
- Automatic capping of the pens on the plotter when the pens are placed in the capping position.
- The simple construction, compact size and low weight allows the HI-80 to be transported easily, and it takes up very little desk space.
- High plotting speed (230 mm per second).
- There are two plotting modes with a further optional ROM to emulate the HP-GP series of plotters.
- The HI-80 can also be used as a printer to produce text in the conventional way. The printer commands use the same ESC/P™ type of commands as the rest of the EPSON range of printers.
- Text can be printed together with graphics so that attractive reports can be made as well as transparencies for overhead projection.
- For enhanced text output an optional ROM is also available which gives letter quality printout.
- User defined characters can be downloaded into the HI-80 if additional RAM is added to the HI-80. This RAM can also be used to provide an 8K buffer if this facility is not required.
- The letter quality option ROM together with the optional RAM also adds the ability to plot using bit image mode, so that screen dumps already written for the EPSON range of dot matrix printers can be used with the HI-80.

The manual covers the wide range of commands and facilities offered by the HI-80, but cannot hope to cover all programming aspects of using the plotter printer. A chapter has been included to give some hints as to how to use the HI-80 with BASIC, LOGO and applications software, which it is hoped will help you begin to obtain the results you require from your new plotter printer.

INTRODUCTION

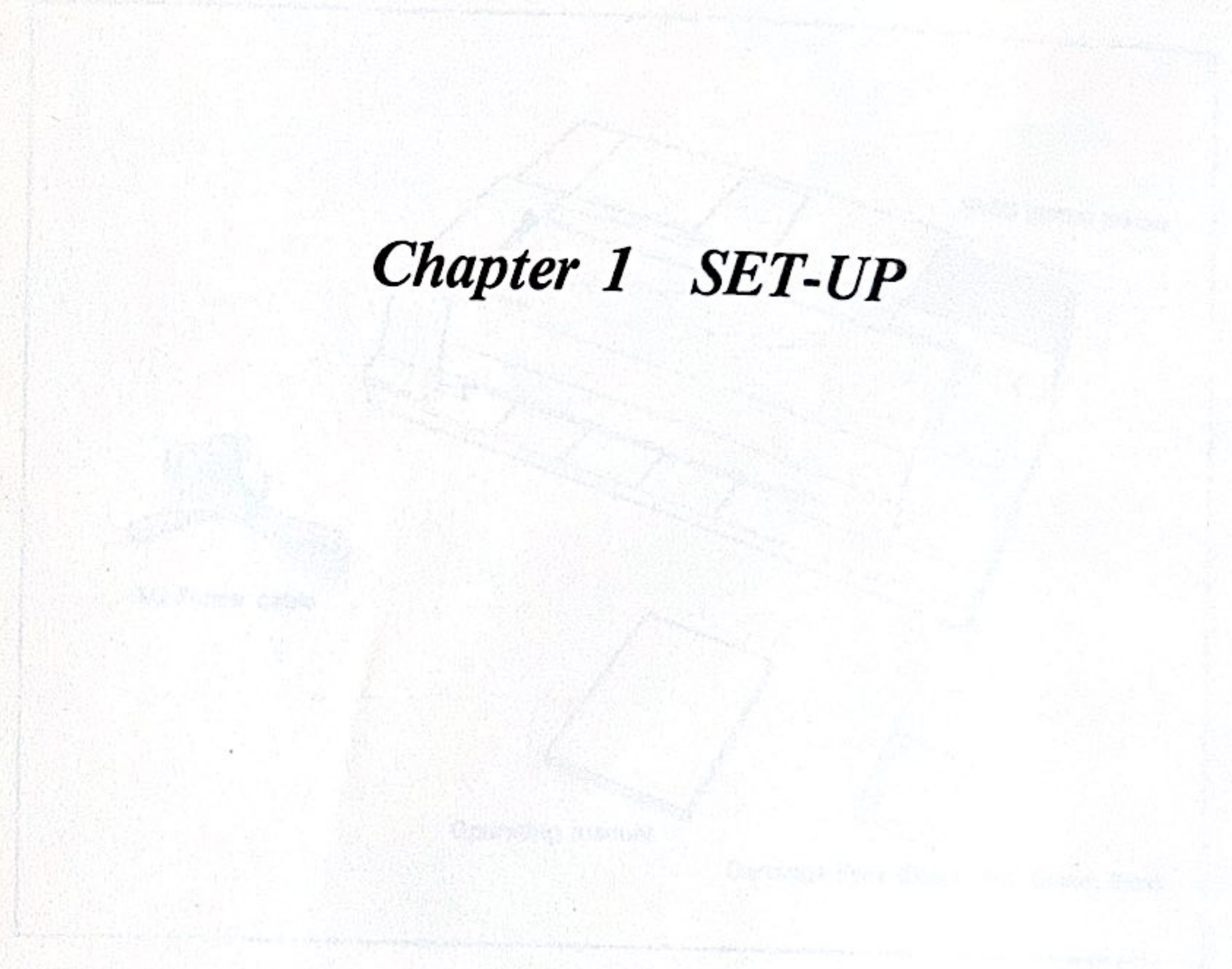
The HP-80 is an easy to use plotter which has many features and commands not present on plotters costing many times the price. It can be used with any program using language or application program which produces text output. Applications programs specifically written for use with the HP-80 will also be available as the HP-80 becomes widely available. However, since there are also commands which enhance other plotters, some application software is already available.

- The features which the HP-80 offers are:
- The ability to use up to four color pens at once with ten colors available.
- Simultaneous substitution of all four pens using an easily replaceable cartridge.
- Three pen types: Fibré tipped pens using oil-based ink for OHP film, fibre tipped pens and ball-point pens for drawing on paper giving different line thicknesses.
- Automatic copying of the pens on the plotter when the pens are placed in the copying position.
- The simple construction, compact size and low weight allows the HP-80 to be transported easily and it takes up very little desk space.
- High plotting speed (230 mm per second).
- There are two plotting modes with a further optional ROM to emulate the HP-CP series of plotters.
- The HP-80 can also be used as a printer to produce text in the conventional way. The printer commands use the same BASIC type of commands as the text mode.
- The HP-80 can be used together with graphics so that accurate reproduction of text as well as transparencies for overhead projection.
- For enhanced text output an optional ROM is also available which gives letter quality printing.
- User defined characters can be downloaded into the HP-80 if additional RAM is added to the HP-80. This RAM can also be used to provide an 8K buffer if this facility is not required.
- The letter quality option ROM together with the optional RAM also adds the ability to plot using bit image mode so that screen dumps already written for the HP-80 range of dot matrix printers can be used with the HP-80.

The manual covers the wide range of commands and facilities offered by the HP-80 but cannot hope to cover all programming aspects of using the plotter. A chapter has been included to give some hints as to how to use the HP-80 with BASIC, LOGO and application software, which it is hoped will help you begin to obtain the results you require from your new plotter.

1.1 Unpacking and Parts Check

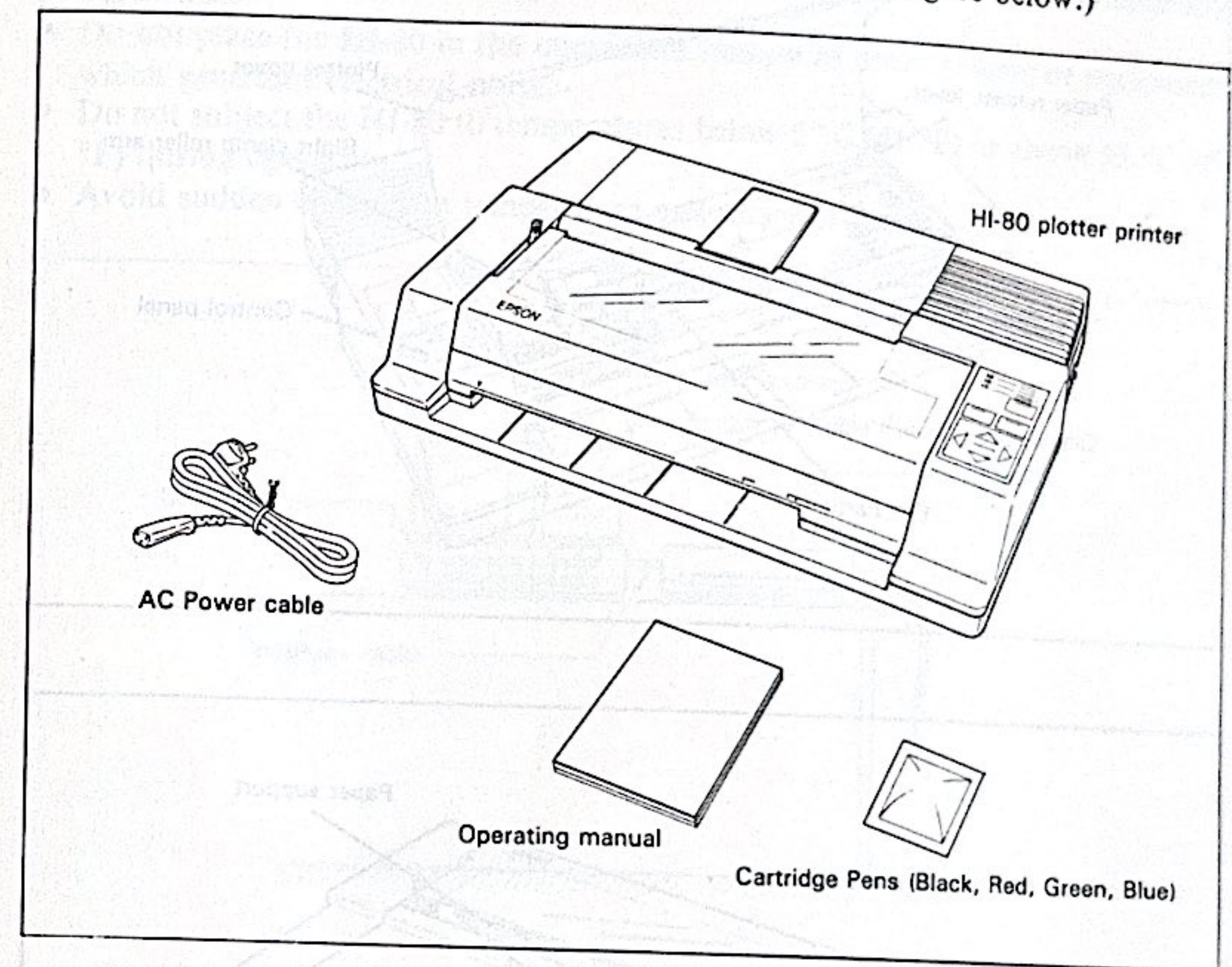
When you unpack the HP-80 plotter you should find the following items. Check that all items are present in the correct quantities.



Note: It is recommended that the plotter be kept in its original packaging until it is needed.

1.1 Unpacking and Parts Check

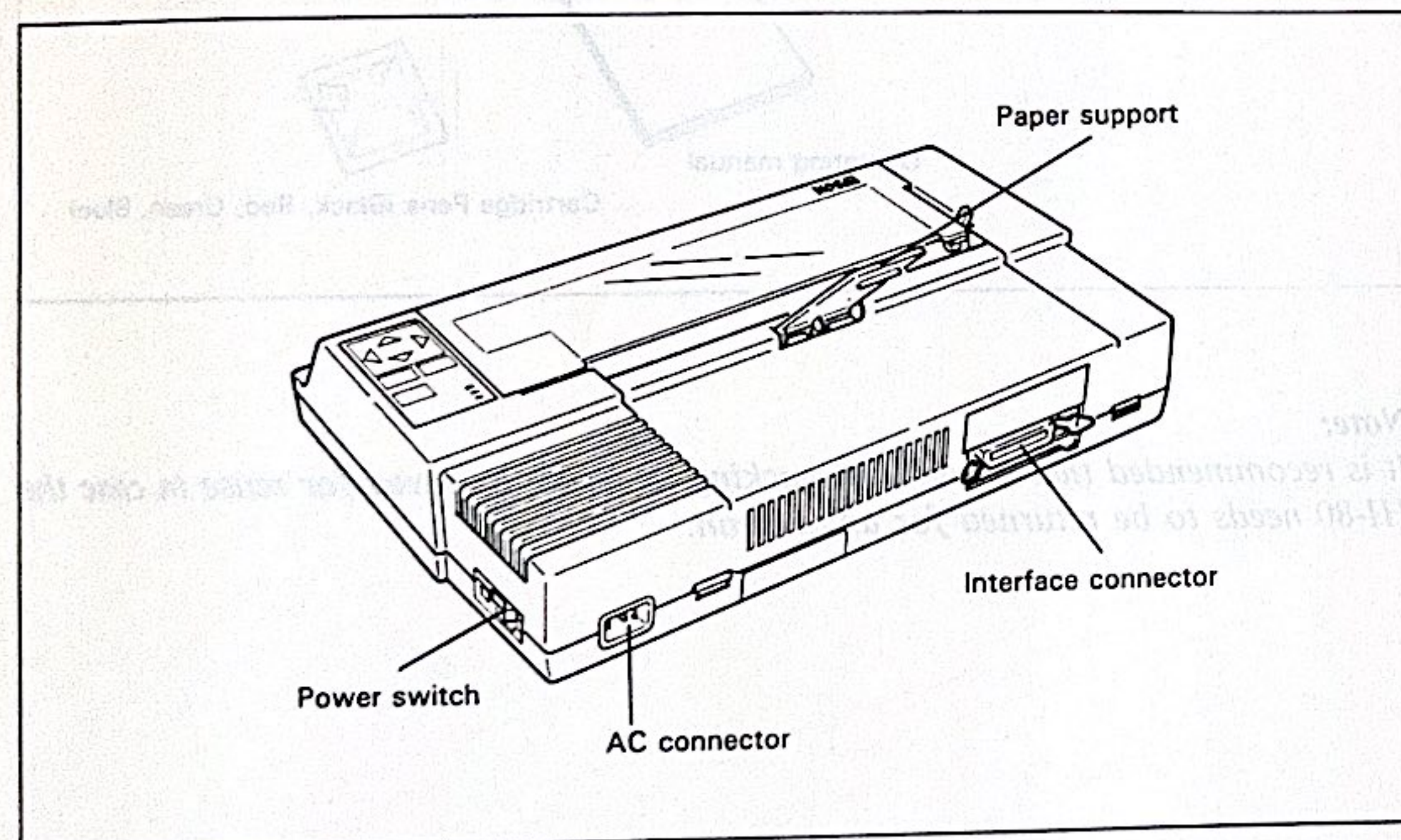
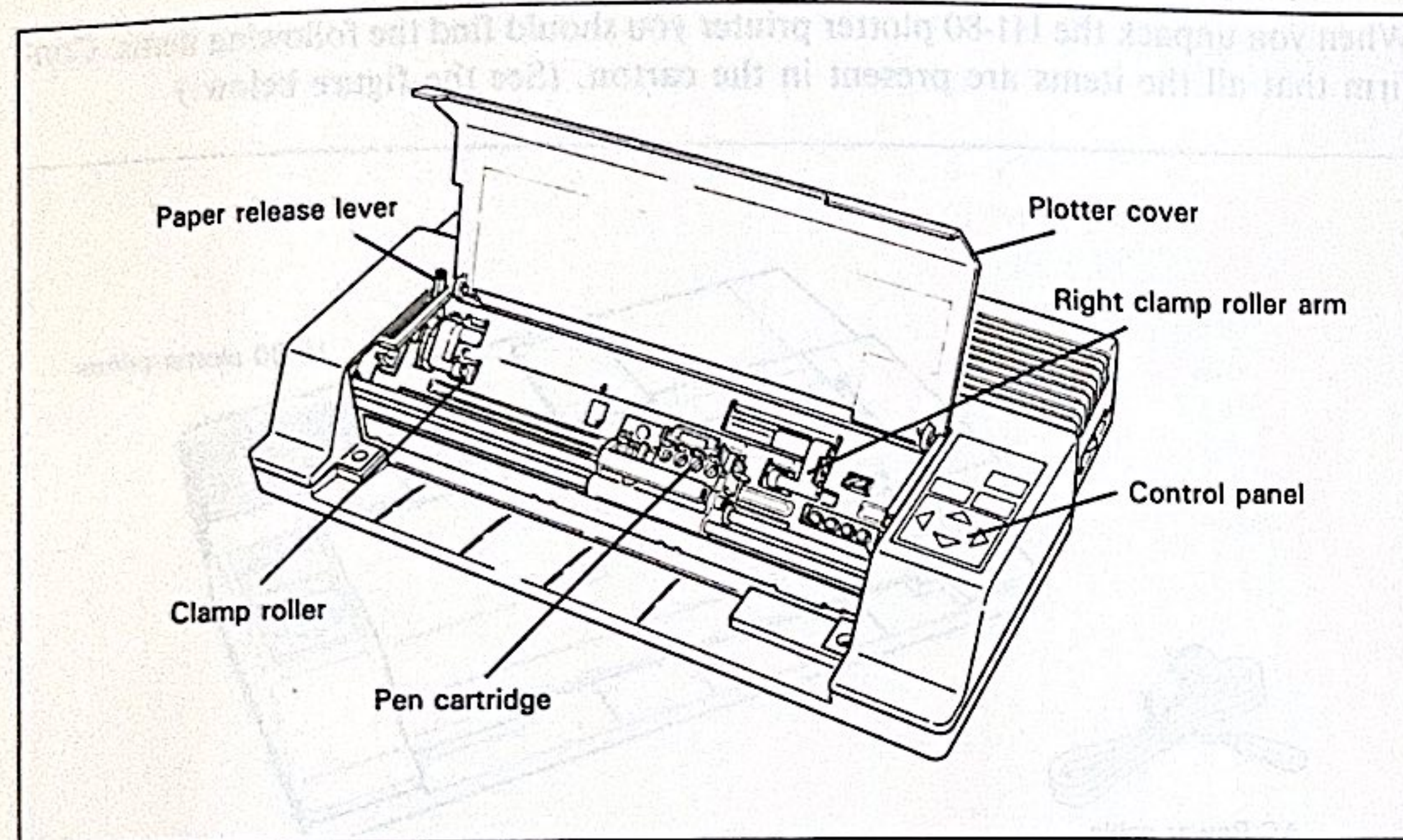
When you unpack the HI-80 plotter printer you should find the following items. Confirm that all the items are present in the carton. (See the figure below.)



Note:

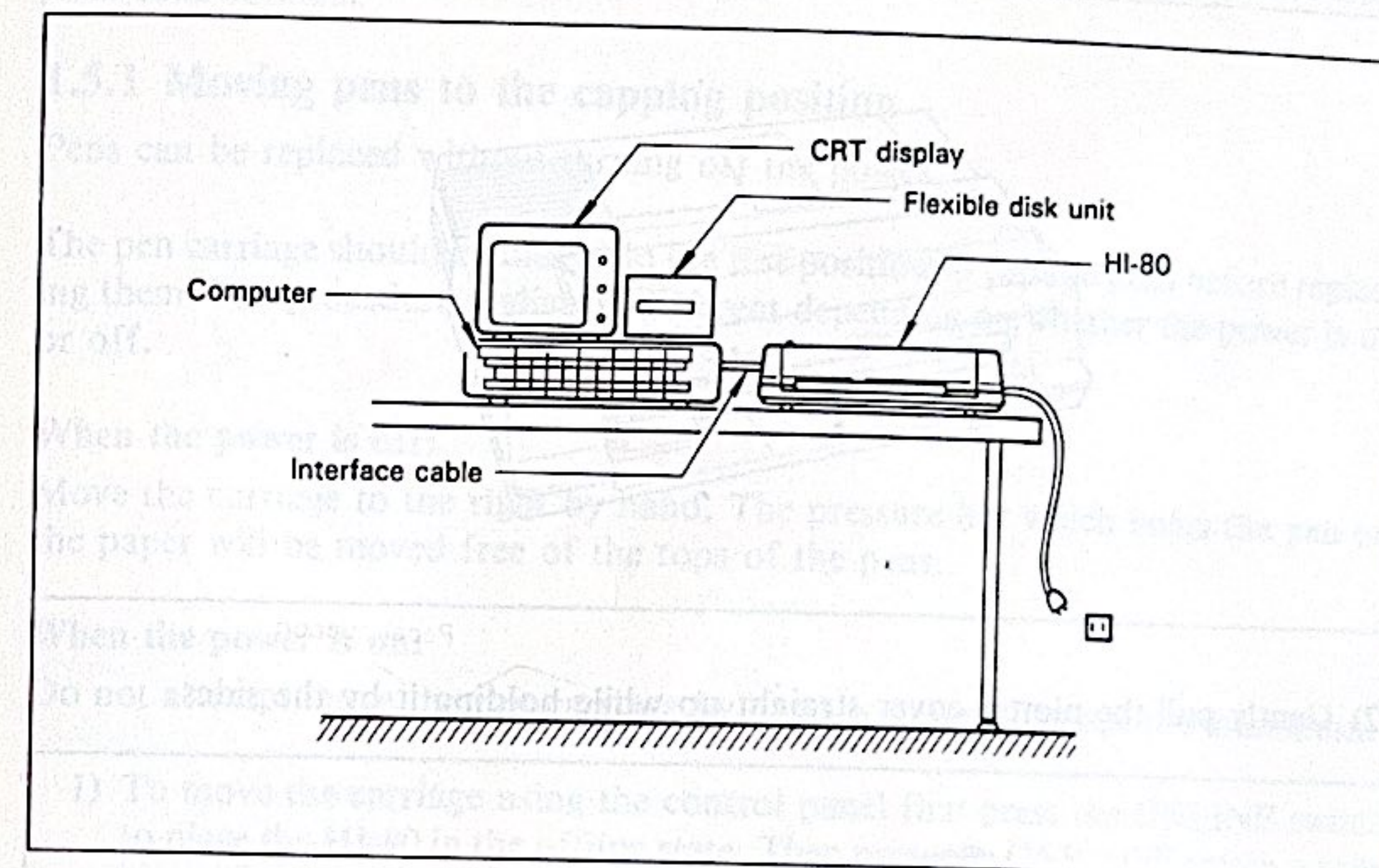
It is recommended that all original packing materials be saved for reuse in case the HI-80 needs to be returned for any reason.

1.2 Names of Parts



1.3 Operating Site Selection

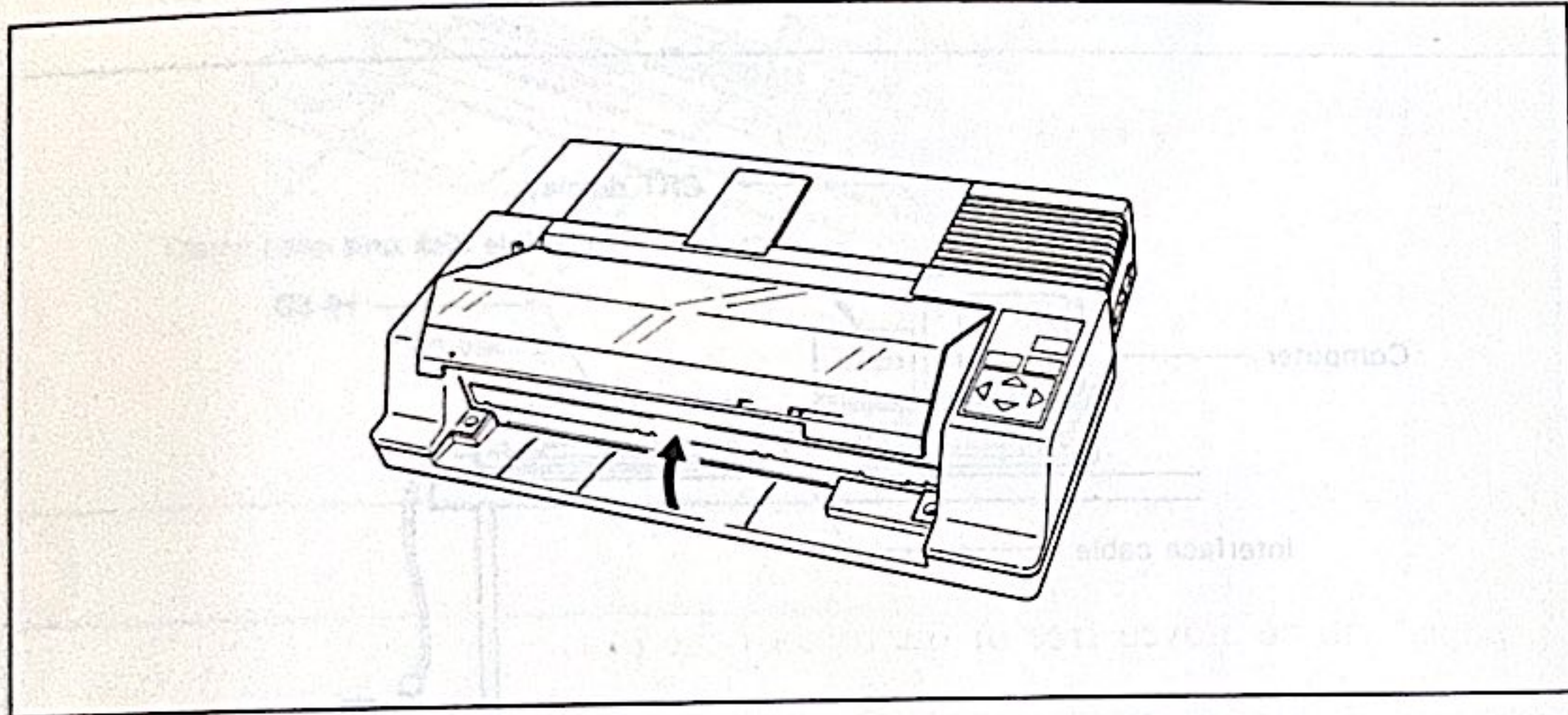
- The HI-80 should be installed on a flat, stable surface of ample size as shown below.
- Care should be taken to avoid exposing the HI-80 to direct sunlight, grease or airborne dust.
- Do not place the HI-80 in the immediate vicinity of room heaters or equipment which generates electrical noise.
- Do not subject the HI-80 to temperatures below 5 °C (41 °F) or above 35 °C (95 °F) during operation.
- Avoid sudden changes in temperature and physical shock.



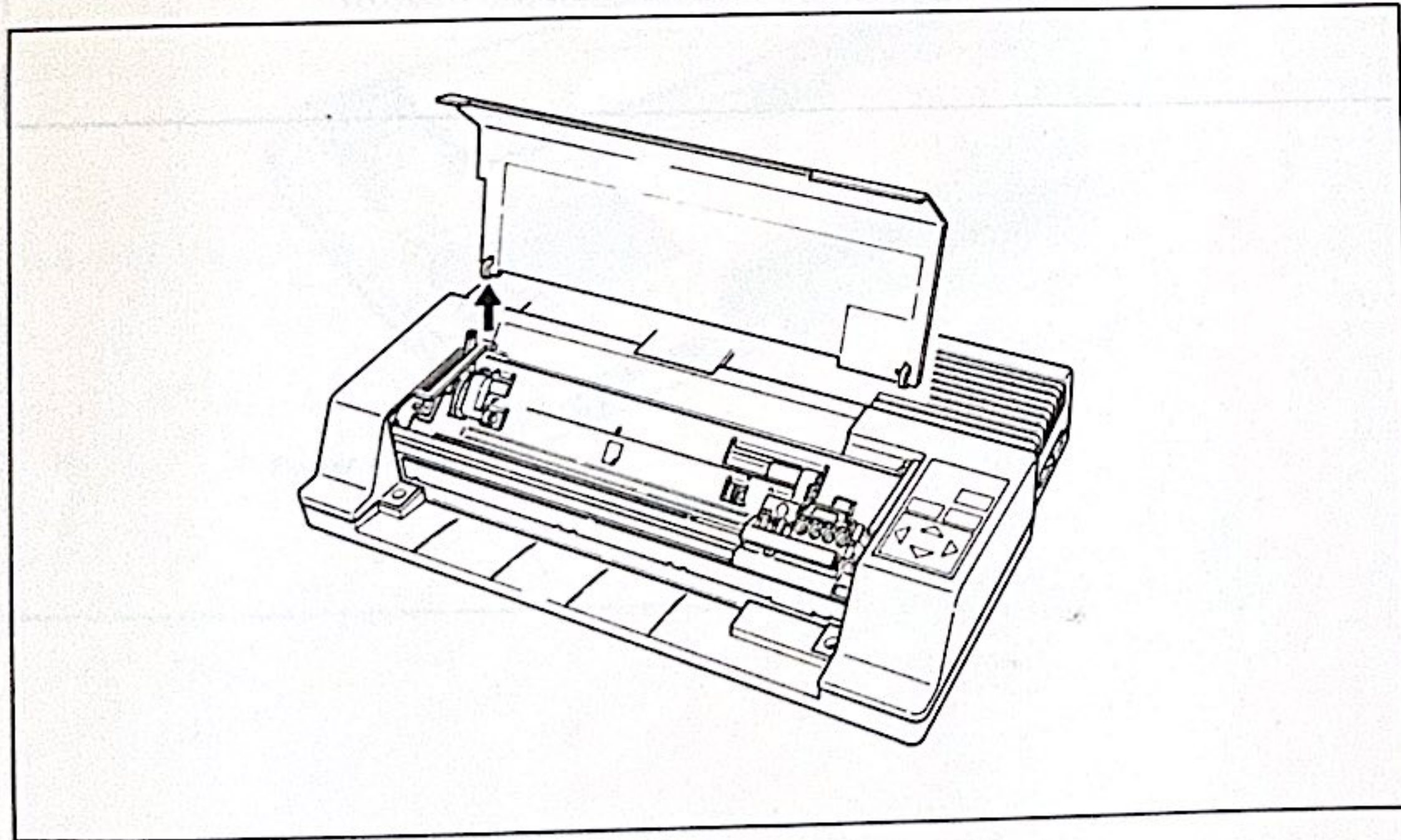
1.4 Removing the Plotter Cover

The HI-80 has a plastic cover in order to cut down noise during operation. It is not normally necessary to remove this cover during operation. If the pen cartridge needs to be inserted or the pen changed, the cover can be lifted to the upright position. However, you may need to remove the cover for other reasons such as watching the plotter printer draw. The procedure for removing the plotter cover is as follows.

- (1) Raise the plotter cover to the vertical position by lifting its front edge.



- (2) Gently pull the plotter cover straight up while holding it by the sides.



Reverse the above procedure to re-install the plotter cover.

1.5 Installing the Pen Cartridge

Pens may be replaced either individually or in groups by changing the pen cartridge.

If you change the pen type, replace all of the pens. If oil-based and aqueous pens are used to write at the same time, they may contaminate each other and stop each other writing.

If you purchase separate pen cartridges (optional), you can replace all the pens simultaneously when you change the pen type. This is also useful if you wish to use more than four colours.

1.5.1 Moving pens to the capping position

Pens can be replaced without turning off the power.

The pen carriage should be moved to the rest position to cap the pens before replacing them. The procedure is slightly different depending on whether the power is on or off.

When the power is off:

Move the carriage to the right by hand. The pressure bar which holds the pen on the paper will be moved free of the tops of the pens.

When the power is on:

Do not attempt move the pen carriage by hand, you may damage the mechanism.

- 1) To move the carriage using the control panel first press the ONLINE switch to place the HI-80 in the offline state. Then press the CAP/OFF switch on the control panel. The pen carriage will move to the capping position.
- 2) To move the pen carriage under software control, use the following commands in the various plotter or printer modes. Other possibilities are described under the appropriate command.

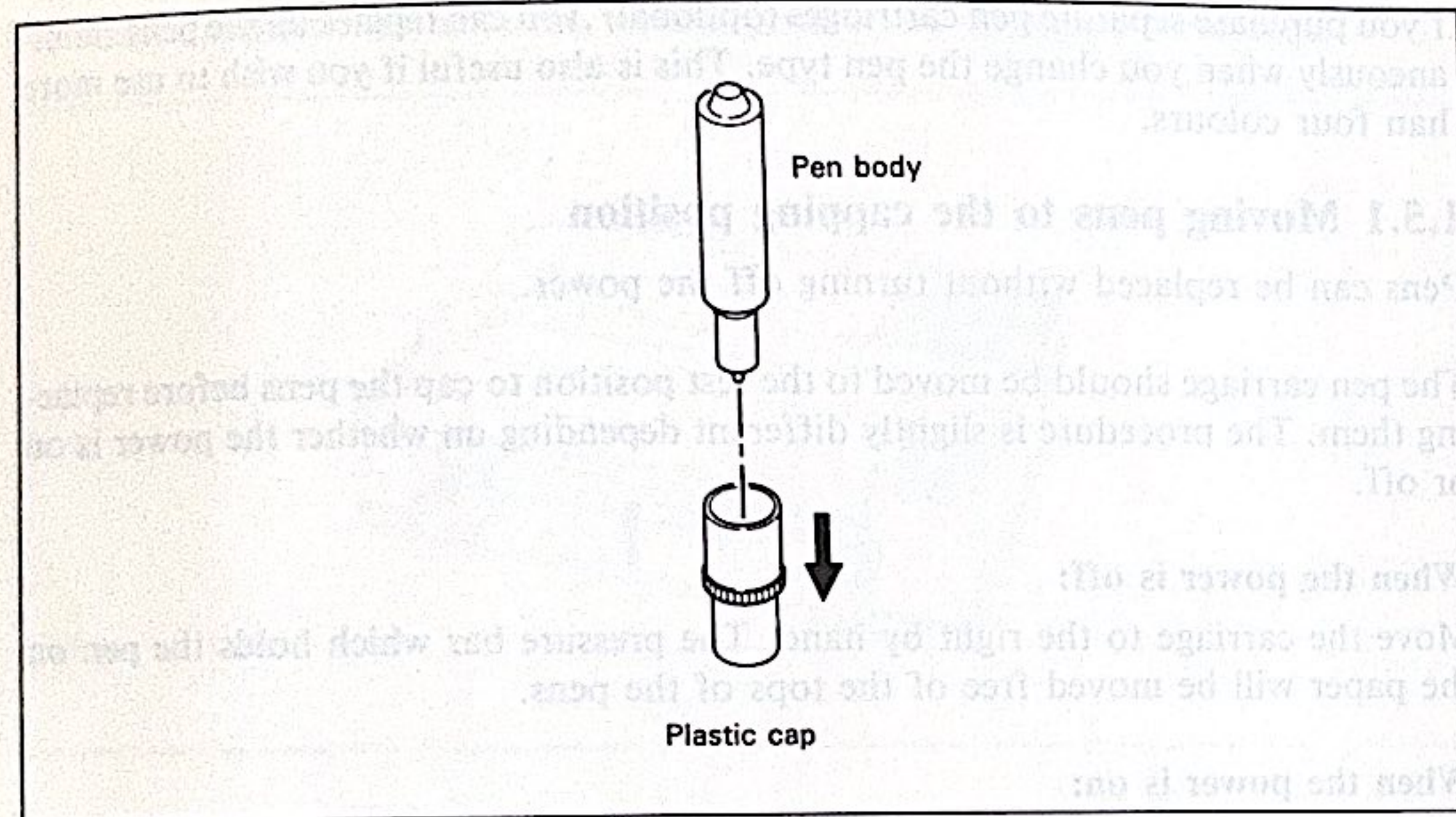
In plotter mode 0 send the "SP0" command to the plotter from the host computer. In plotter mode 1 send the "J0" command. In printer mode send the <GS> "C0" command.

1.5.2 Installing pens in the cartridge chambers

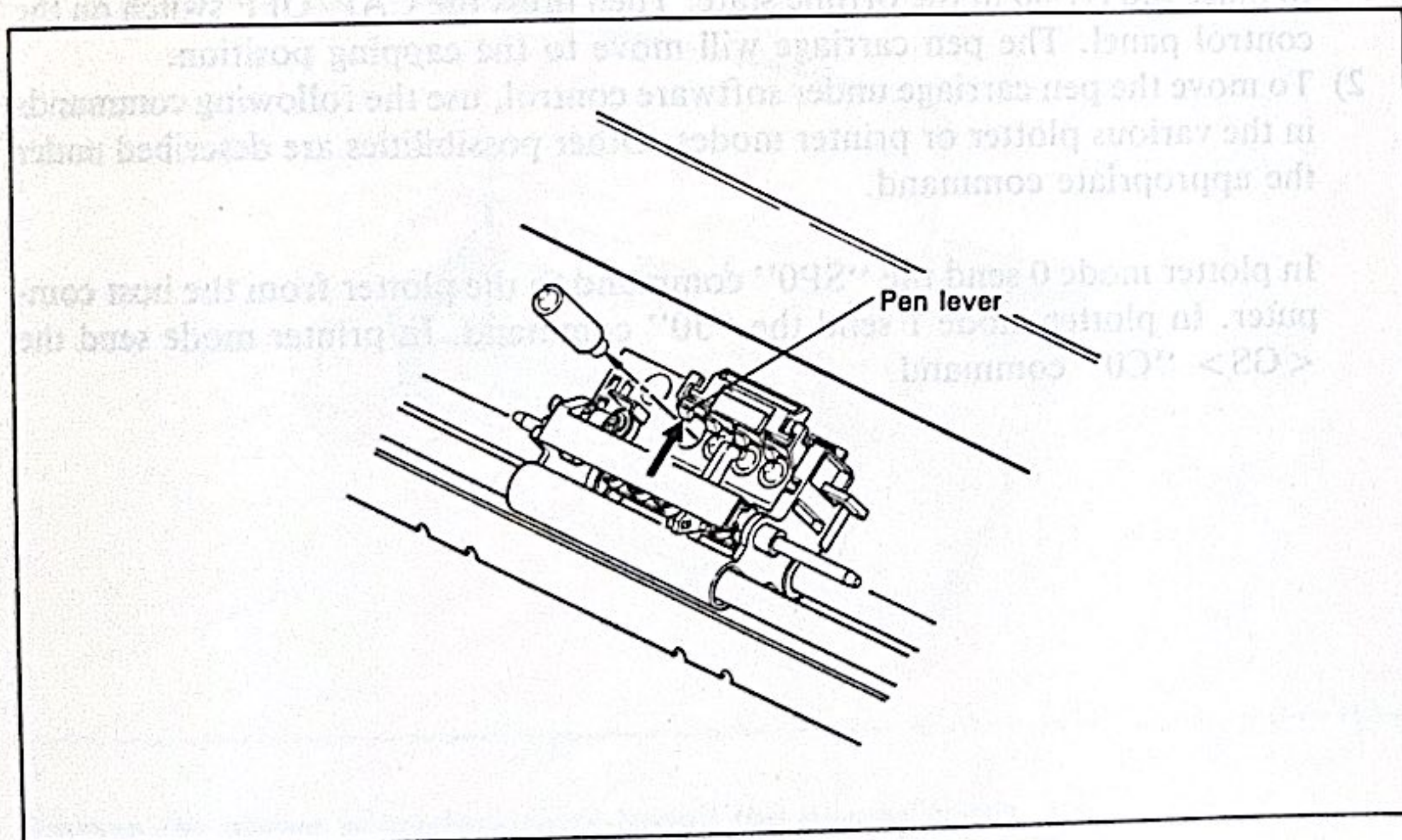
- (1) Remove a pen from the package and take off its plastic cap. Save the plastic cap.

Note:

Although pens are capped at the capping position to prevent drying, it is recommended that they be removed from the cartridge and capped with the original plastic caps if the plotter is not used for several days.



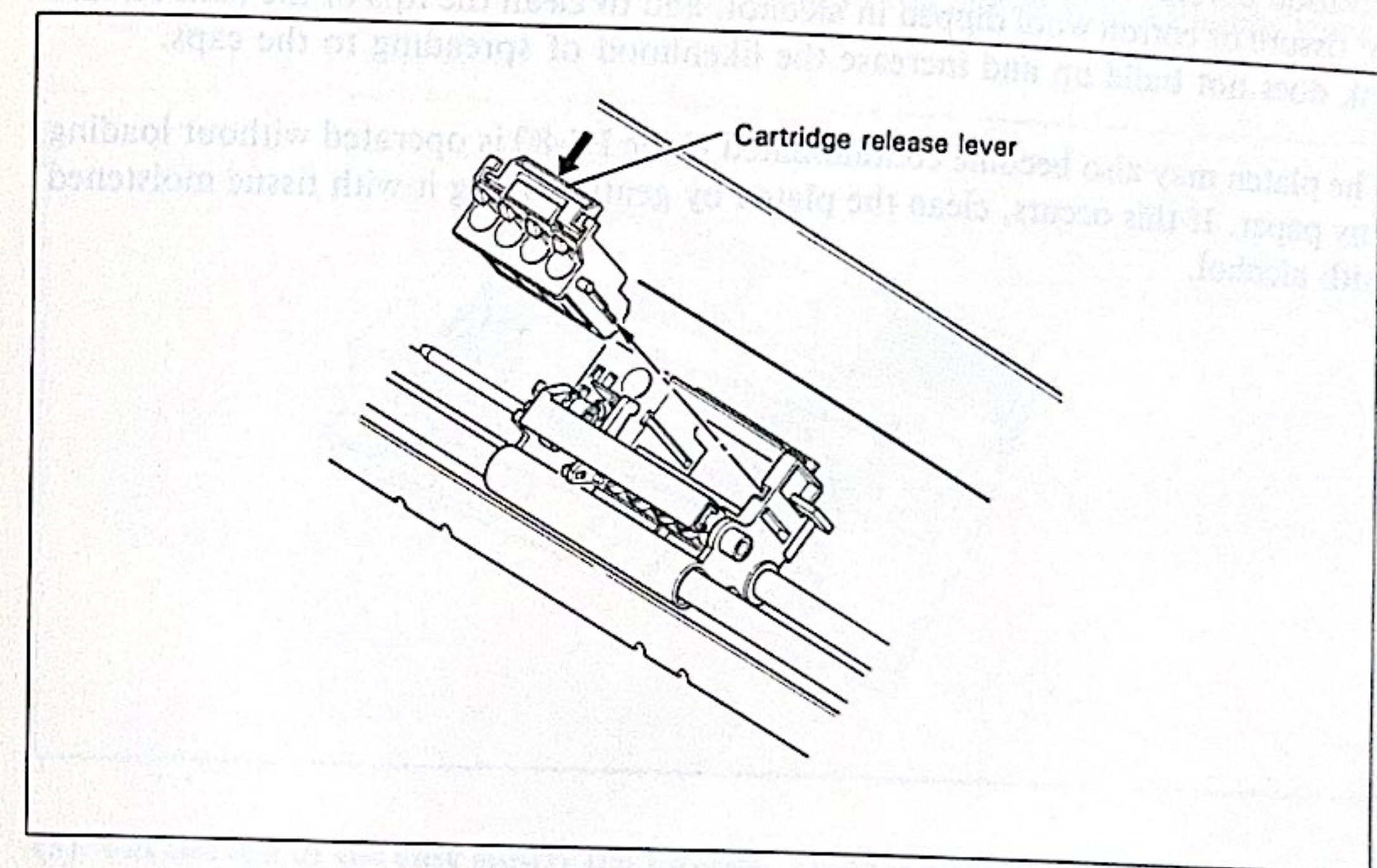
- (2) Check the number of the cartridge chamber in which the pen is to be installed. Insert the pen by pushing gently until it hooks under the pen lever.



1.5.3 Removing and installing the pen cartridge

The pen cartridge is easily removed by pressing the cartridge release lever to free the cartridge and then pulling it out.

Press and hold the cartridge release lever and pull the cartridge upwards as shown in the diagram.



To install the pen cartridge, insert it along the guide grooves until the cartridge latch engages.

1.5.4 Cleaning the pen caps and platen.

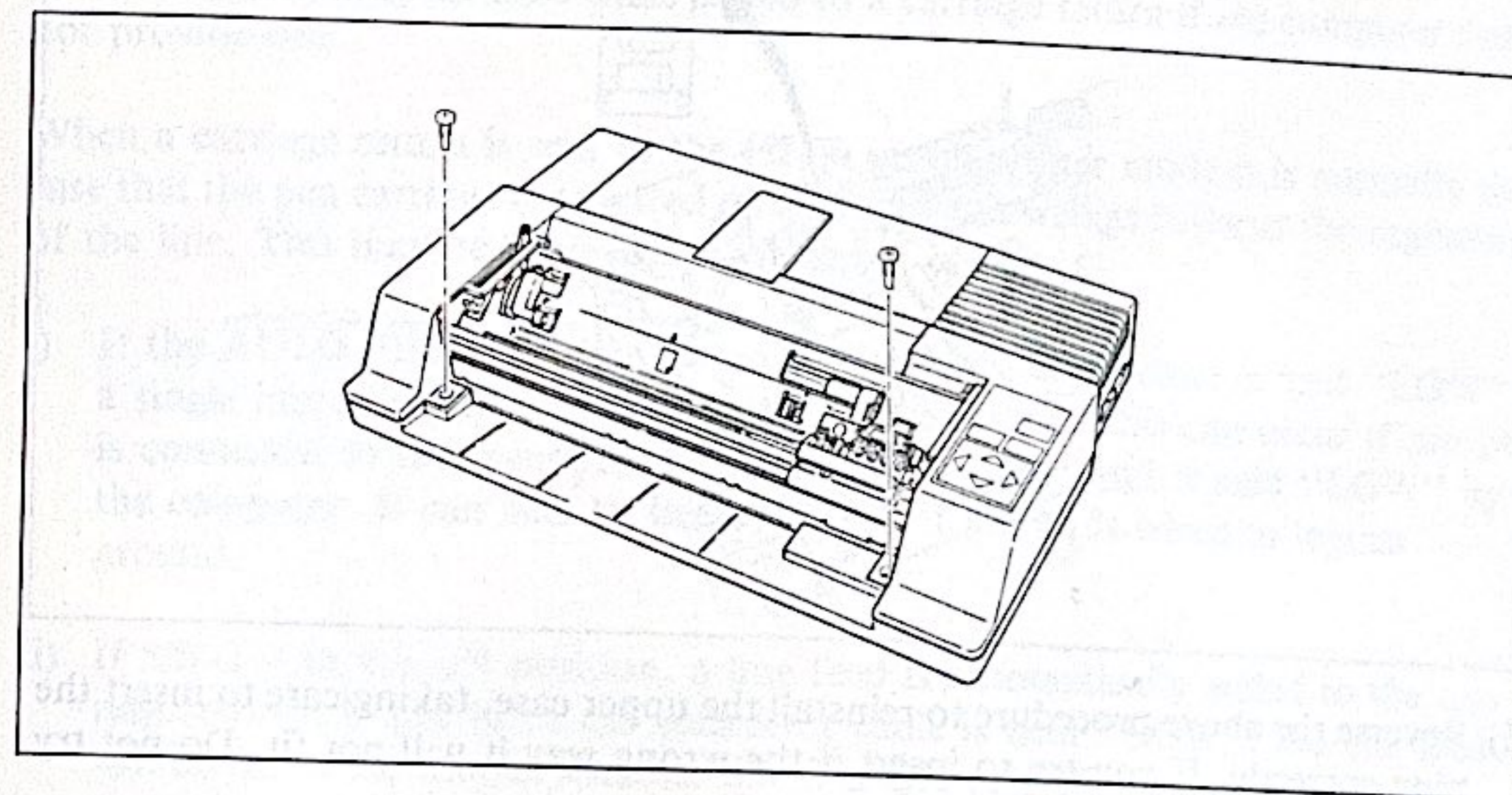
Ink from the pens may be transferred to the pen caps during use. When pen colors are changed, the first part of a drawing may not be the correct color because the pen tip has picked up some ink left on the pen cap by the previous pen. This can be minimised by ensuring that the pen carriage is properly located at the capping position before changing the pens. It also helps to clean the pen caps with a piece of tissue or cotton wool dipped in alcohol, and to clean the tips of the pens so that ink does not build up and increase the likelihood of spreading to the caps.

The platen may also become contaminated if the HI-80 is operated without loading any paper. If this occurs, clean the platen by gently wiping it with tissue moistened with alcohol.

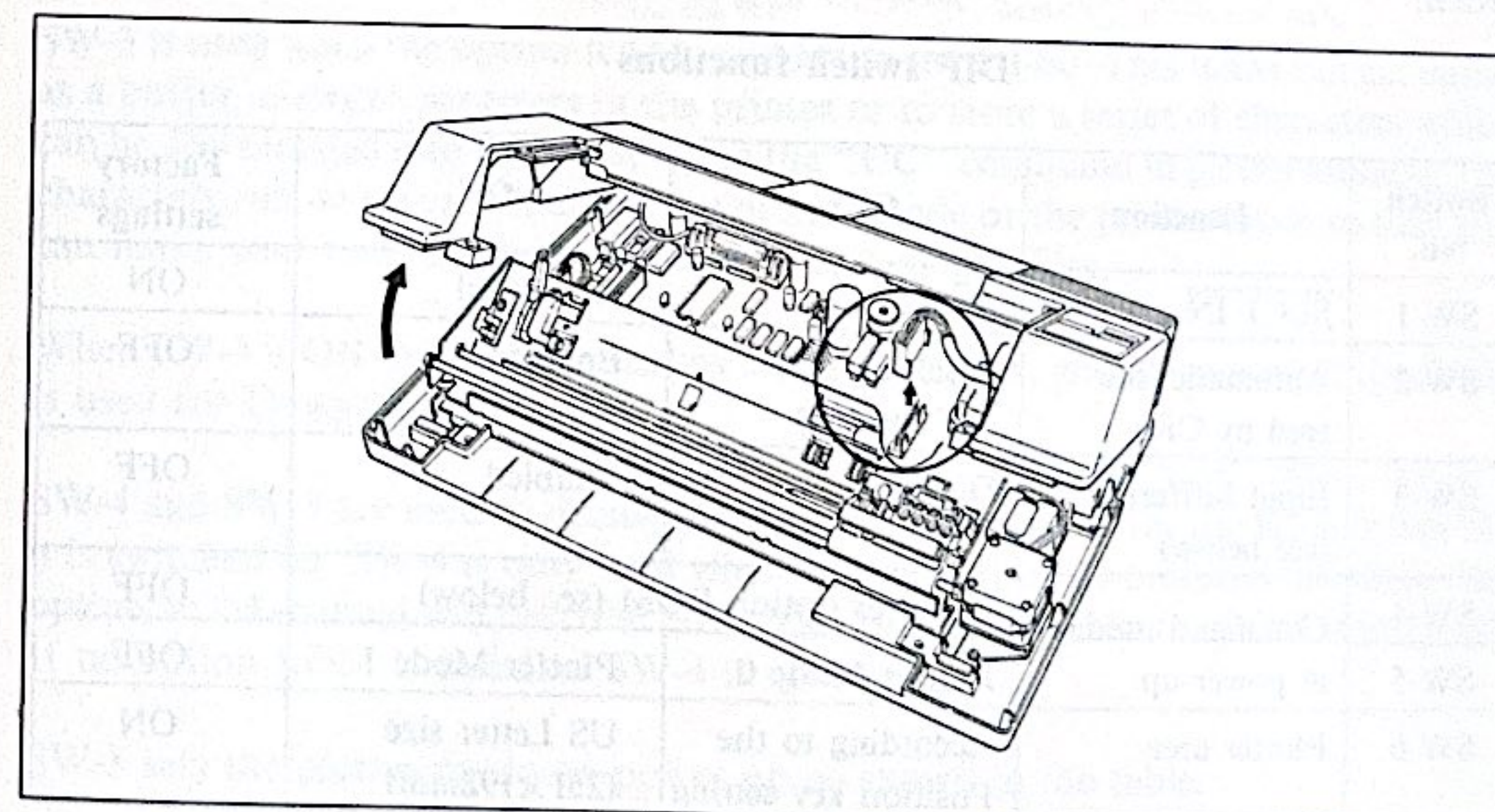
1.6 Setting DIP Switches

There are a set of DIP switches on the main circuit board which set certain default settings on power up. The procedure for altering the DIP switch setting is as follows.

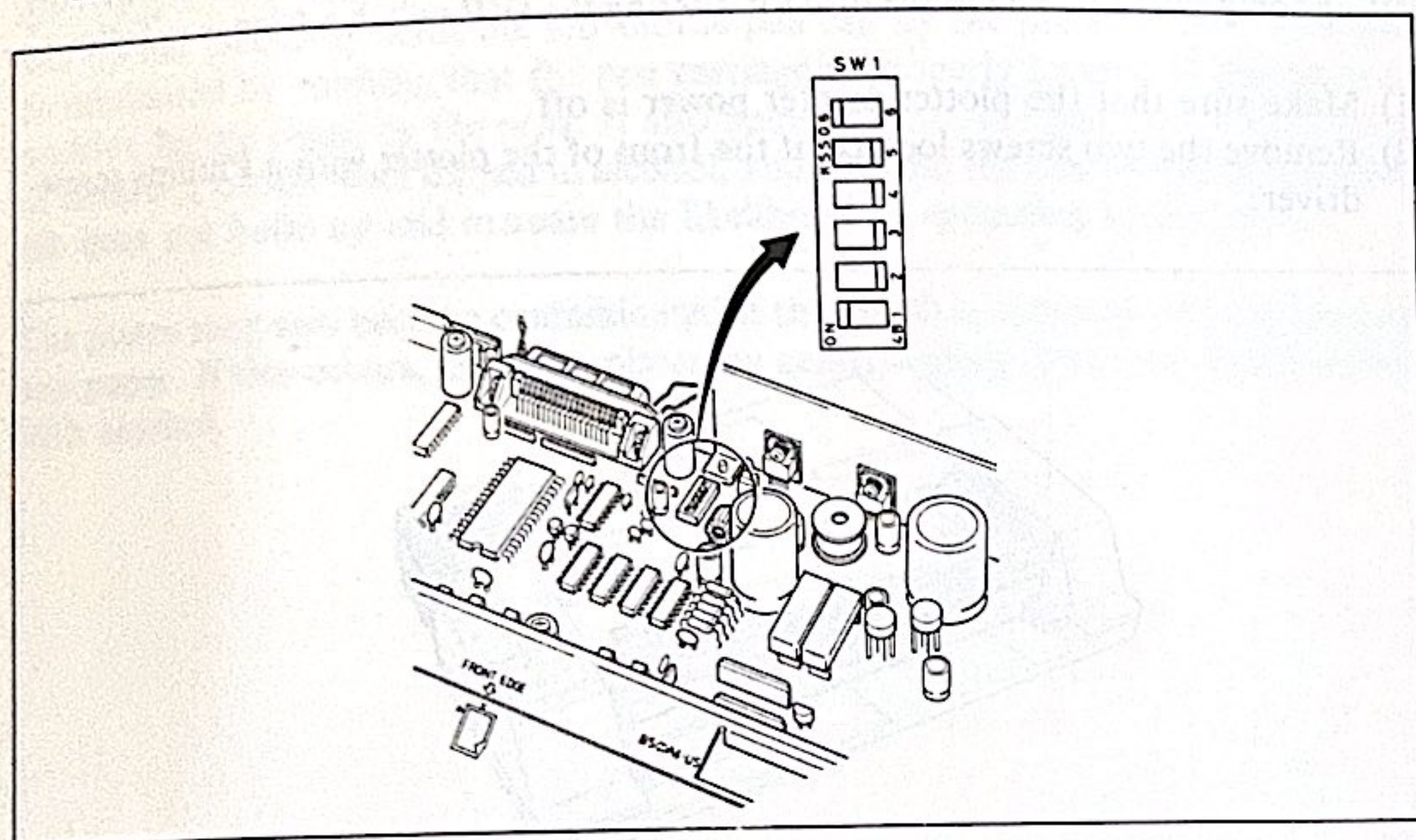
- (1) Make sure that the plotter printer power is off.
- (2) Remove the two screws located at the front of the plotter with a Phillips screw-driver.



- (3) Tilt the top of the case slowly backwards. There is a cable connecting the control panel on the top part of the case to the main circuit board. Only tilt the top of the case to a position such that you can reach the connector which links the control panel cable to the circuit board. Now unplug the connector from the circuit board and remove the upper case.



- (4) Set the DIP switches appropriately referring to the DIP switch functions shown below. Use the tip of a ball-point pen or a matchstick to set the position of the switches.



- (5) Reverse the above procedure to reinstall the upper case, taking care to insert the plug correctly. If you try to insert it the wrong way it will not fit. Do not try to force it.

Caution:

Static electricity from your body can damage the plotter electronics. To avoid this, touch a grounded metal object (such as a water pipe) before working inside the plotter, and be careful to avoid touching the circuit board components other than the DIP switch.

DIP switch functions

Switch No.	Function	OFF	ON	Factory settings
SW-1	SLCT IN	Active	Grounded	ON
SW-2	Automatic line feed by CR	Disabled (LF needed)	Enabled	OFF
SW-3	Input buffering (see below)	Disabled	Enabled	OFF
SW-4	Command mode at power-up	Requires option ROM (see below)		OFF
SW-5		Plotter Mode 0	Plotter Mode 1	OFF
SW-6	Plotter area	According to the Position key setting	US Letter size (251 × 192mm)	ON

The functions of the switches are as follows.

SW-1 allows the HI-80 to be activated and deactivated by the computer so that data can be accepted or rejected. By sending the control code DC1 (ASCII code (17)_D) the SLCT IN line is set to "HIGH" until a DC3 code (ASCII codes (19)_D) is sent to set it to "LOW". When the SLCT IN line is set to "HIGH" data is received but ignored. When the switch is set to ON these codes have no effect.

SW-2 is to enable a line feed to be added to a carriage return if the computer does not provide one.

When a carriage return is sent to the HI-80 in the printer mode it is normally the case that the pen carriage is required on a new line as well as being at the beginning of the line. This may be achieved in a number of ways.

- If the AUTO FEED XT (pin 14 on the interface connector) is held "LOW" a single line feed will be added to a carriage return. This can occur if pin 14 is connected to the computer by the interface cable, and is held "LOW" by the computer. It can also be held "LOW" if pin 14 is wired to logical ground.
- If SW-2 is in the ON position, a line feed is automatically added to the carriage return. If pin 14 of the connector cable is held "LOW", the line feed will be added no matter whether SW-2 is ON or OFF.
- The computer can send a line feed with a carriage return. Your computer manual should tell you if this is so. If the computer does send a line feed, and either pin 14 is held "LOW" or SW-2 is set to ON, double line spacing will result. This can be cured by setting the DIP switch to OFF, and breaking the connection to pin 14.

HM6264P = RAM socket Markings

SW-3 is used when the option RAM is added to the HI-80. This RAM can act either as a buffer to store characters in the printer or to store a series of characters which can be downloaded into the HI-80 using the "UC" command in plotter mode 0. The characters can be printed in either the plotter mode or the printer mode so that you can make your own characters either for text or graphics.

When SW-3 is ON the RAM is used as a storage buffer, and when it is off the RAM is used for Download characters.

27256-25 Rom socket Marking

SW-4 and SW-5 are used to decide the default plotter mode for the HI-80 when the it is switched on. SW-4 is only used when an external ROM option is installed. The option ROM manual will describe how to set the switch when the ROM is installed. If no option ROM is installed SW-4 is ignored.

SW-5 sets the plotter mode on power up as shown in the table.

SW-6 allows different paper sizes to be set immediately after power up. The default setting is to US letter size paper if the switch is set to ON. If SW-6 is OFF the other paper sizes (B5 and A4) have to be set as described in section 2.4. Paper size can also be altered using software commands.

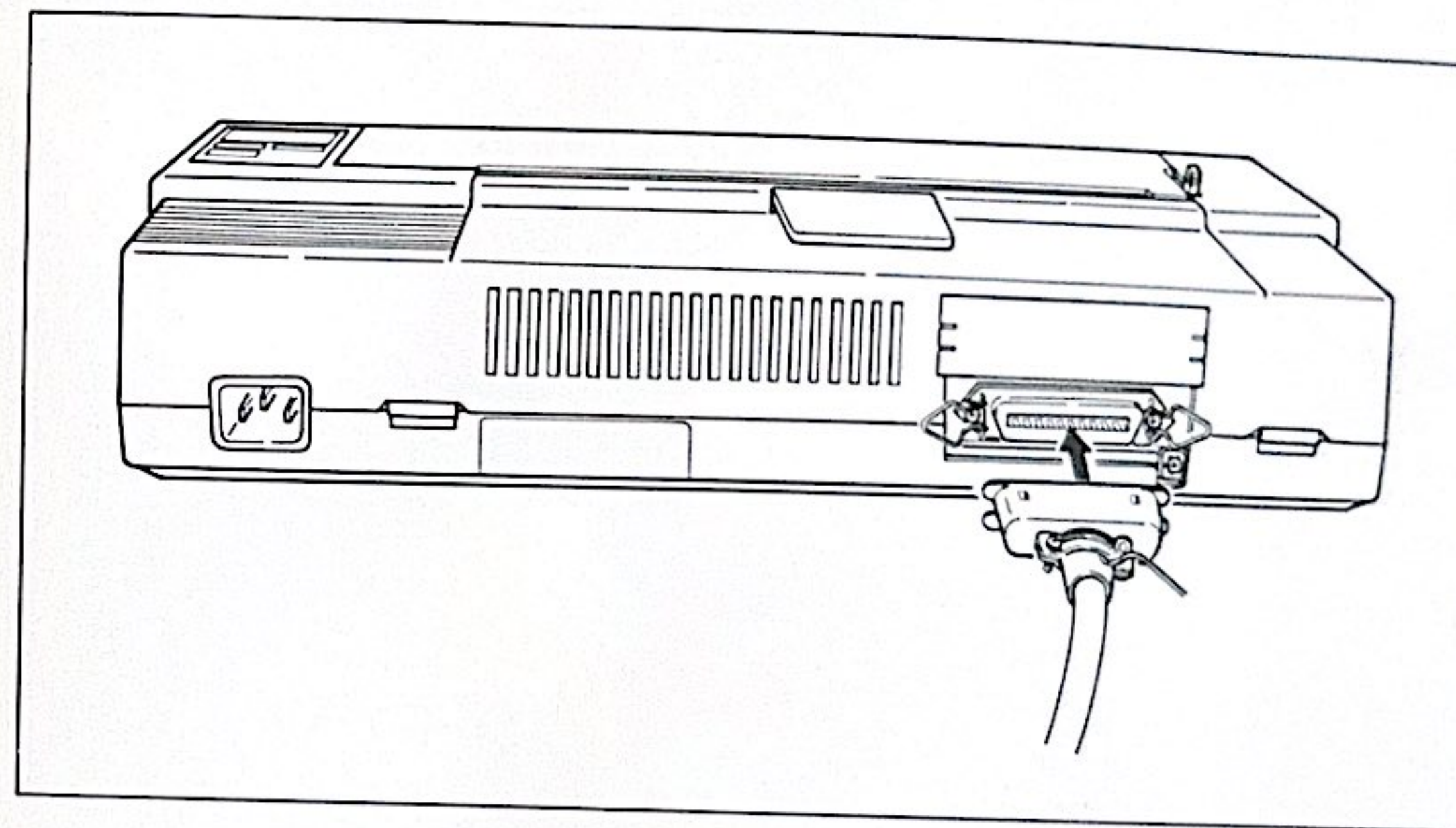
1.7 Connecting the Plotter to a Computer

Your HI-80 can be connected directly to any computer which is equipped with a Centronics parallel interface.

If your computer has a serial interface it is necessary to fit a serial interface board to the HI-80. (See Appendix C.2)

When connecting your HI-80 to the computer the following points should be adhered to:

- Make sure that both the computer and plotter are turned off.
- Use the correct type of cable, plug the cable connector firmly into the plotter, and secure the connector by fastening the wire clips.
- Fasten the cable grounding wire (if present) to the grounding screws on the HI-80 and the computer.



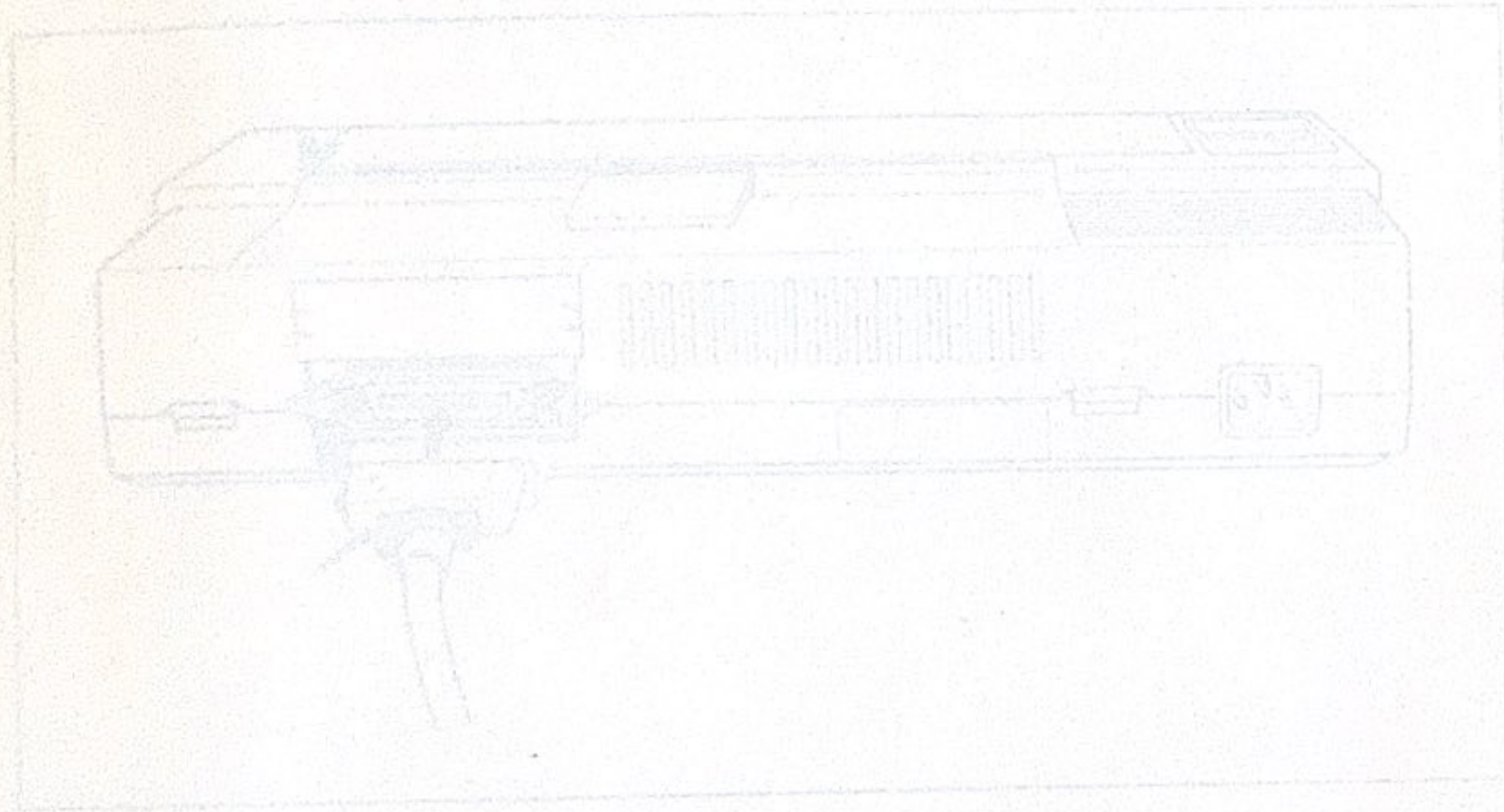
1.7 Connecting the Printer to a Computer

Your HI-80 can be connected directly to any computer which is equipped with a parallel printer interface.

If your computer has a serial interface it is necessary to fit a serial interface board to the HI-80. (See Appendix C.)

When connecting your HI-80 to the computer the following points should be noted:

- Make sure that both the computer and printer are turned off.
- Use the correct type of cable, plug the cable connector firmly into the printer, and secure the connector by fastening the wire tie.
- Fasten the cable grounding wire (if present) to the grounding screw on the HI-80 and the computer.



2.1 Power

Your HI-80 operates on one of the following three AC voltages:

- 120 VAC, 50/60 Hz
- 230 VAC, 50/60 Hz
- 240 VAC, 50/60 Hz

Before connecting the HI-80 to an AC outlet, check the AC rating label on the rear panel. Connecting the HI-80 to the wrong voltage power supply may damage the HI-80 or result in improper operation.

Chapter 2 OPERATION

If your HI-80 has an AC rating which differs from the available AC power, do not attempt to operate it and consult your dealer.

Avoid connecting your HI-80 to an AC outlet where there are electrical appliances, motors or other equipment which generate noise.

2.1 Power

Your HI-80 operates on one or other of the following three AC voltages.

- 120 VAC, 50/60 Hz
- 220 VAC, 50/60 Hz
- 240 VAC, 50/60 Hz

Before connecting the HI-80 to an AC outlet, check the AC rating label on the rear panel. Connecting the HI-80 to the wrong voltage power supply may damage the HI-80 or result in incorrect operation.

If your HI-80 has an AC rating which differs from the available AC power, do not attempt to operate it and consult your dealer.

Avoid connecting your HI-80 to an AC outlet whose lines are connected to large motors or other equipment which generate noise.

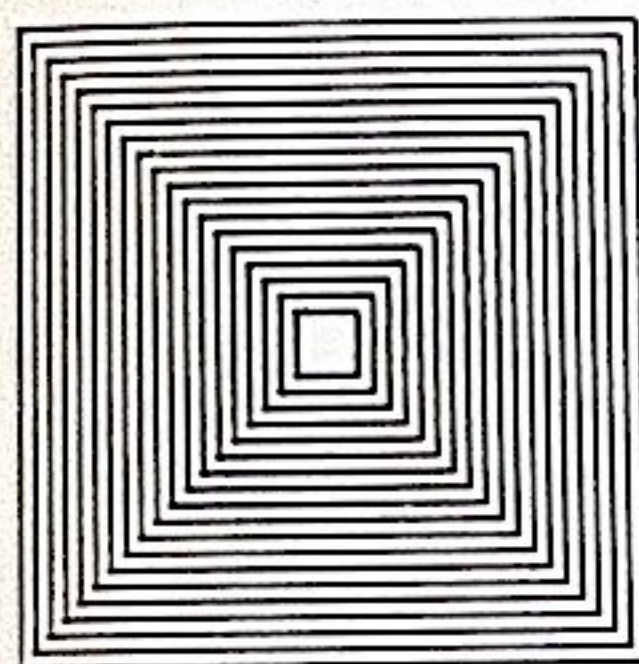
2.2 Pen Types

The standard accessory package of the HI-80 includes aqueous ink fiber pens in four colors (black, red, green, and blue). Other types and colors of pens which may be purchased separately are as follows.

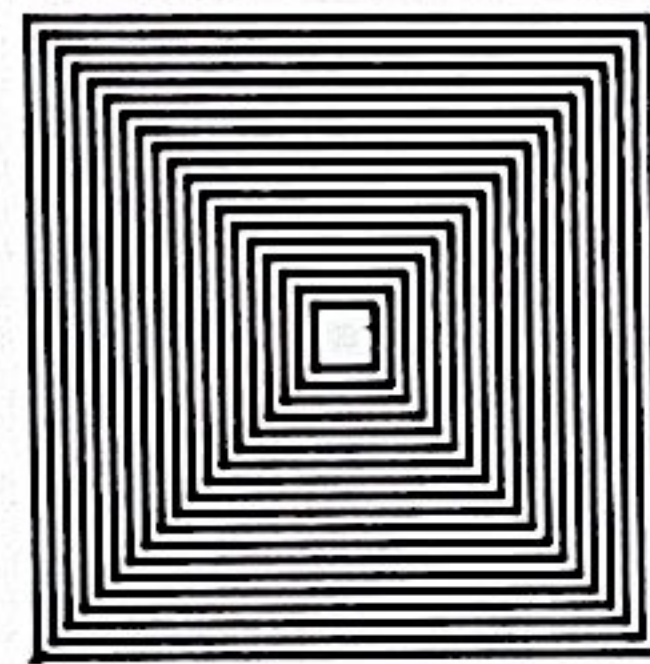
- Fiber pens (10 colors, aqueous ink)
- Fiber pens (10 colors, oil-based ink)
- Ball-point pens (10 colors, aqueous ink)

Aqueous ink pens are for drawing on ordinary paper and oil-based pens are for drawing on transparent over head projector (OHP) films. Some types of paper may not be suitable for the aqueous pens (see section 2.5).

The ball-point pens will draw a finer point than the fiber pens. The following diagram shows the output from both types of pen.



<Ball-point Pen>



<Fiber Pen>

The ten ink colors which are available are as follows.

Black	Cyan	Red
Magenta	Green	Light brown
Blue	Violet	Yellow
Orange		

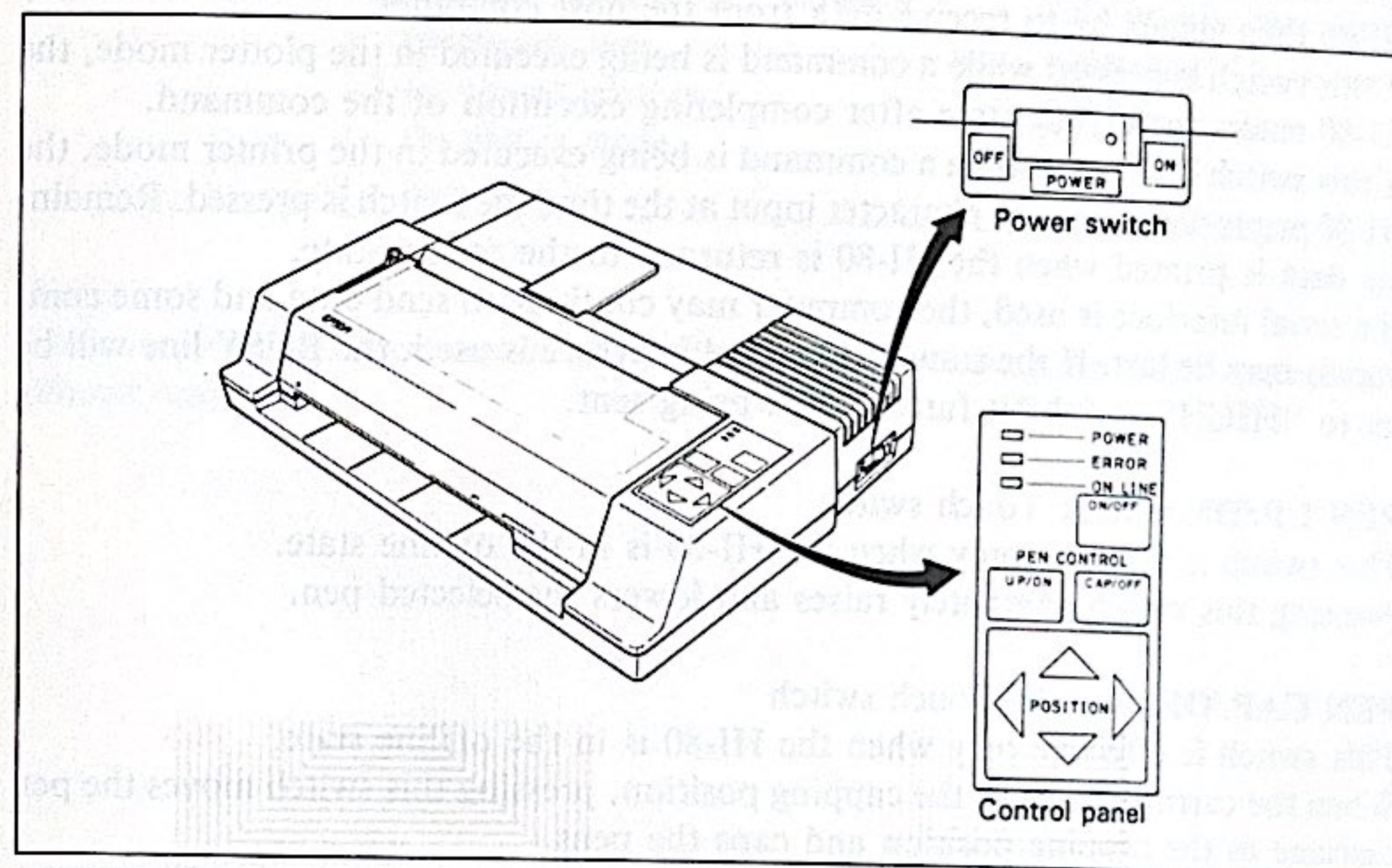
See Example of Color Printing (2) at the front of this manual for color samples.

2.3 Switches and Indicators

There are a number of types of switches and indicators on the HI-80.

The main power switch is located on the right side of the case.

There are seven touch switches which control the operation of the plotter printer. These are located on the control panel along with three indicators. The touch switches are activated by pressing until the surface is felt to give slightly.



2.3.1 Switches

Power switch: Rocker switch

The power switch turns the mains power on and off.

The HI-80 is initialized immediately after the power switch is turned on. This results in the initialization procedure being carried out as described in section 2.4. Because initialization causes the paper rollers to be moved, if no paper is inserted the rubber pressure roller will come into direct contact with the metal pressure grip roller. It is preferable if the paper is inserted before switching on or that the pressure arms are raised to the HOLD position before switching on.

Note:

Some computers send characters to the printer when they are switched on, when the computer disks are booted or when a programming language such as BASIC is loaded. These characters can be interpreted by the HI-80 as unrecognisable commands and will generate errors. Always switch the HI-80 on AFTER the program or programming language has been loaded.

The plotter mode can be changed if certain of the control panel switches are pressed at the same time as the power switch is activated. See section Appendix D.3 for details. It is also possible to initiate a self test on power up (see section 3.1.4). The position of the DIP switches (see section 1.6) decide the default mode when the power is turned on.

ONLINE switch: Touch switch

The ONLINE switch switches between the online and offline states. The online state is automatically selected after the power switch is turned on. The HI-80 then stands by to receive data from the host computer. If this switch is pressed while a command is being executed in the plotter mode, the HI-80 enters the offline state after completing execution of the command. If this switch is pressed while a command is being executed in the printer mode, the HI-80 prints data up to the character input at the time the switch is pressed. Remaining data is printed when the HI-80 is returned to the online state. If a serial interface is used, the computer may continue to send data and some commands may be lost. If the standard parallel interface is used, the BUSY line will be set to "HIGH" to inhibit further data being sent.

PEN UP/DN switch: Touch switch

This switch is effective only when the HI-80 is in the offline state. Pressing this switch alternately raises and lowers the selected pen.

PEN CAP/OFF switch: Touch switch

This switch is effective only when the HI-80 is in the offline state. When the carriage is not at the capping position, pressing this switch moves the pen carriage to the capping position and caps the pens. When the carriage is at the capping position, pressing this switch moves the pen carriage to the point at which it was located before it was moved to the capping position. The pen selected is that in cartridge chamber 1.

PEN POSITION switches: Four touch switches

These switches are effective only when the HI-80 is in the offline state. Pressing a PEN POSITION switch moves the pen in the direction indicated by the arrow mark on the switch. Pressing two adjacent switches moves the pen diagonally.

- The pen moves 0.1 mm when this switch is pressed and released. However, holding the switch for more than 0.3 seconds moves the pen at the rate of 100 mm/s. The position at which the pen is left is the current pen location. If the software used relies on relative movements, any alteration of the pen position by means of these switches may cause an incorrect picture to be drawn.

The pen cannot be moved beyond the effective drawing area.

2.3.2 Indicators

The meanings of indicators are as follows.

Indicator	Color	ON	OFF	Blinking
POWER	Green	Power-on state	Power-off state	—
ON LINE	Green	Online state	Offline state	1 Paper selection mode 2 Paper change wait mode
ERROR	Red	1 Memory check error during self test 2 Command error in the plotter mode (See note.)	No error	Mechanism error during operation

Note:

Plotter command errors can be controlled by software using the "IM" command in plotter mode 0.

2.4 Initialization

The HI-80 is initialized (i.e. set to a fixed set of conditions) in the following cases.

- When the power switch is turned on.
- When the **INIT** signal is received from the host computer, causing pin 31 of the parallel interface to become LOW.
- When the following software commands are given:
 - the "IN" command in plotter mode 0
 - the ":" command in plotter mode 1
 - the <ESC> "@" sequence in the printer mode.

The initialization sequence proceeds as follows.

- (1) The pen carriage is moved to mechanical home on the left hand side of the pen carriage bar and the pen in cartridge chamber 1 is selected.
- (2) All interface signals are reset.
- (3) The input buffer is cleared.
- (4) Parameters specified for plotter and printer are initialized.

The next step differs according to the setting of DIP switch 5. Step 5 is skipped when DIP switch SW-6 is set to ON, otherwise Step 6 is performed.

- (5) The ON LINE indicator blinks to prompt the operator to press the position switch corresponding to the size of paper to be used.
 - Up arrow switch - B5 size
 - Left arrow switch - U.S. letter size
 - Down arrow switch - A4 size
- (6) The pen carriage moves to indicate the effective drawing area. The position of the paper is 5mm below the position on power up.
- (7) The ON LINE indicator goes on and the HI-80 stands by to receive data.

Notes:

- (i) If the paper is positioned with its edge against the front edge line on the HI-80, the position returned to after moving around the effective drawing area is such that the top of the paper is 5mm below this line. This results in the paper having an effective drawing area as shown in section 2.6.1.
- (ii) This can cause problems if an initialization command is given more than once without changing the paper. The paper will move down successively 5mm and will eventually become too far down to be moved by the rollers. It is recommended that you write software which includes an initialization command so that the user is prompted to reset the paper on the front edge mark before the initialization procedure is invoked.

- (iii) Because the paper is moved completely around the effective drawing area, if the pen position is set in the middle of the paper, the initialization command will cause the paper to be ejected from the HI-80.

2.5 Types of Paper and Paper Loading

It is possible to use many types of paper with the HI-80. It is also possible to use OHP film provided the oil-based fiber pens are used. The paper needs to be flexible as it is moved up and down when the pen plots.

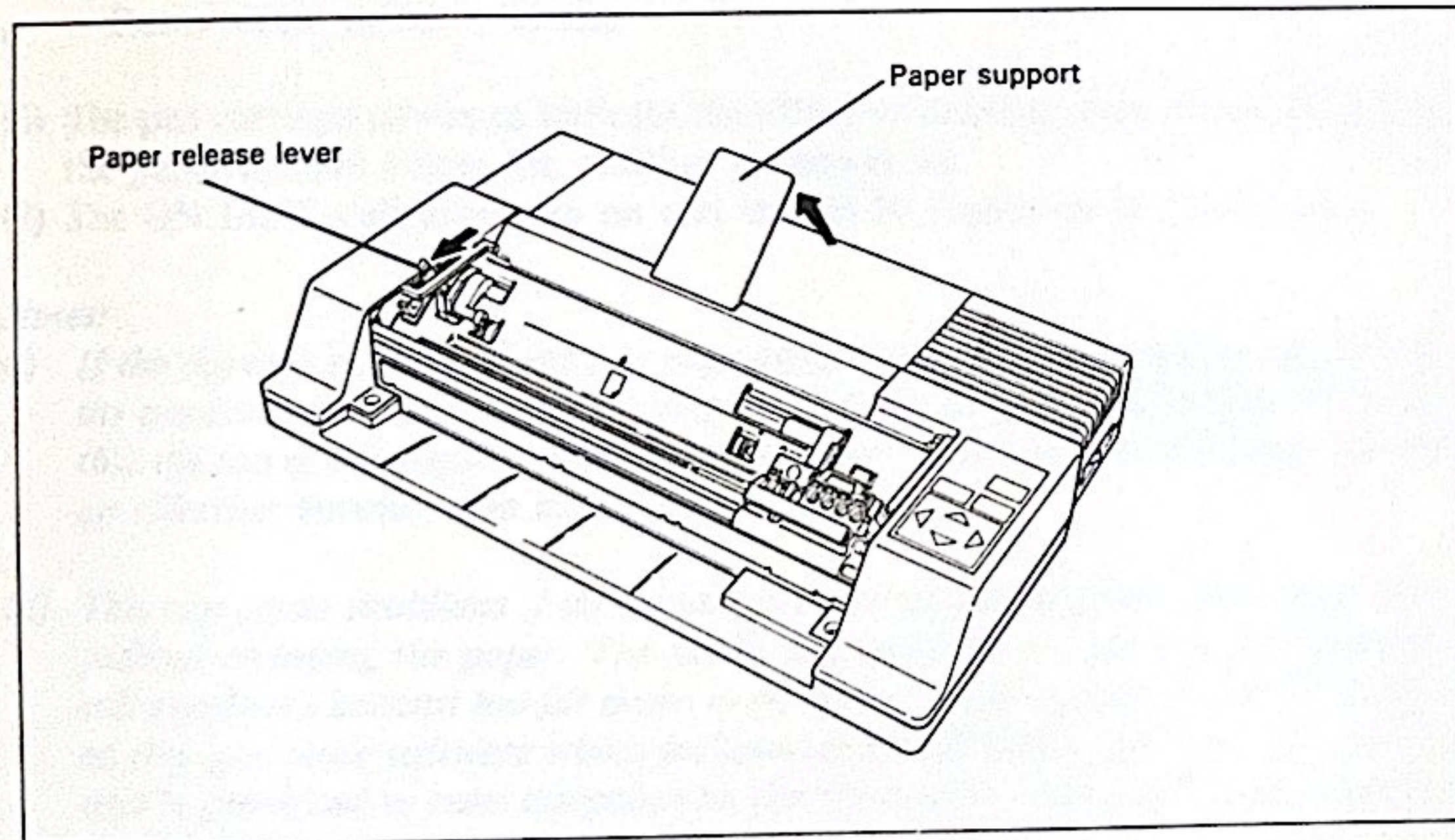
Note:

Some types of paper are not suitable for the aqueous ball-point tipped pens. Waxes and other additives from the paper coating are liable to contaminate the pen tip causing the ink to reject the surface of the roller. This will be shown by the pen randomly missing parts of the drawing. In this case the paper is not suitable. The best type of paper to use is one without a coating.

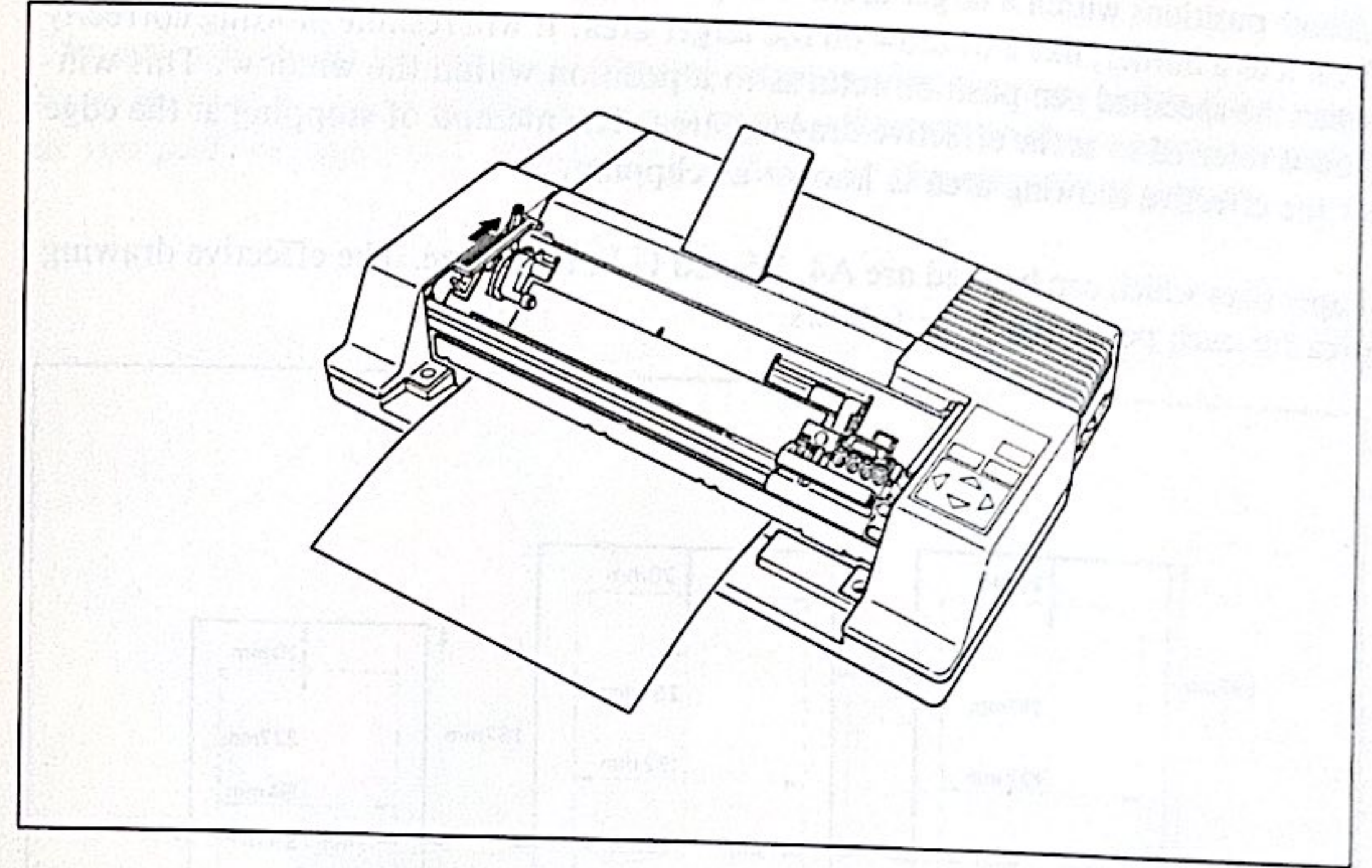
On changing to another paper the pen tip may still be contaminated. The tip can usually be cleaned as follows. Place a drop of liquid detergent (e.g. washing-up liquid) on the surface of a clean piece of paper and add a few drops of water. Mix the two and spread them over the surface of the paper so that the paper is damp but does not contain a pool of water. Write using light pressure for about 30 seconds. The pen may write continuously either on undamped paper or when moved over the dampened paper. Continue to write, however even though the pen seems to be writing correctly as the tip needs to be thoroughly cleaned.

Paper loading procedures are as follows.

- (1) Raise the paper support and pull the paper release lever forward to the FREE position.



- (2) Open the plotter cover and slide the right pressure roller arm to the position which corresponds to the paper size, then close the plotter cover.
- (3) Insert the paper into the front paper inlet.
- (4) Align the front edge of the paper with the front edge line and align the left edge with the left edge mark.



- (5) Return the paper release lever to the HOLD position.

Note:

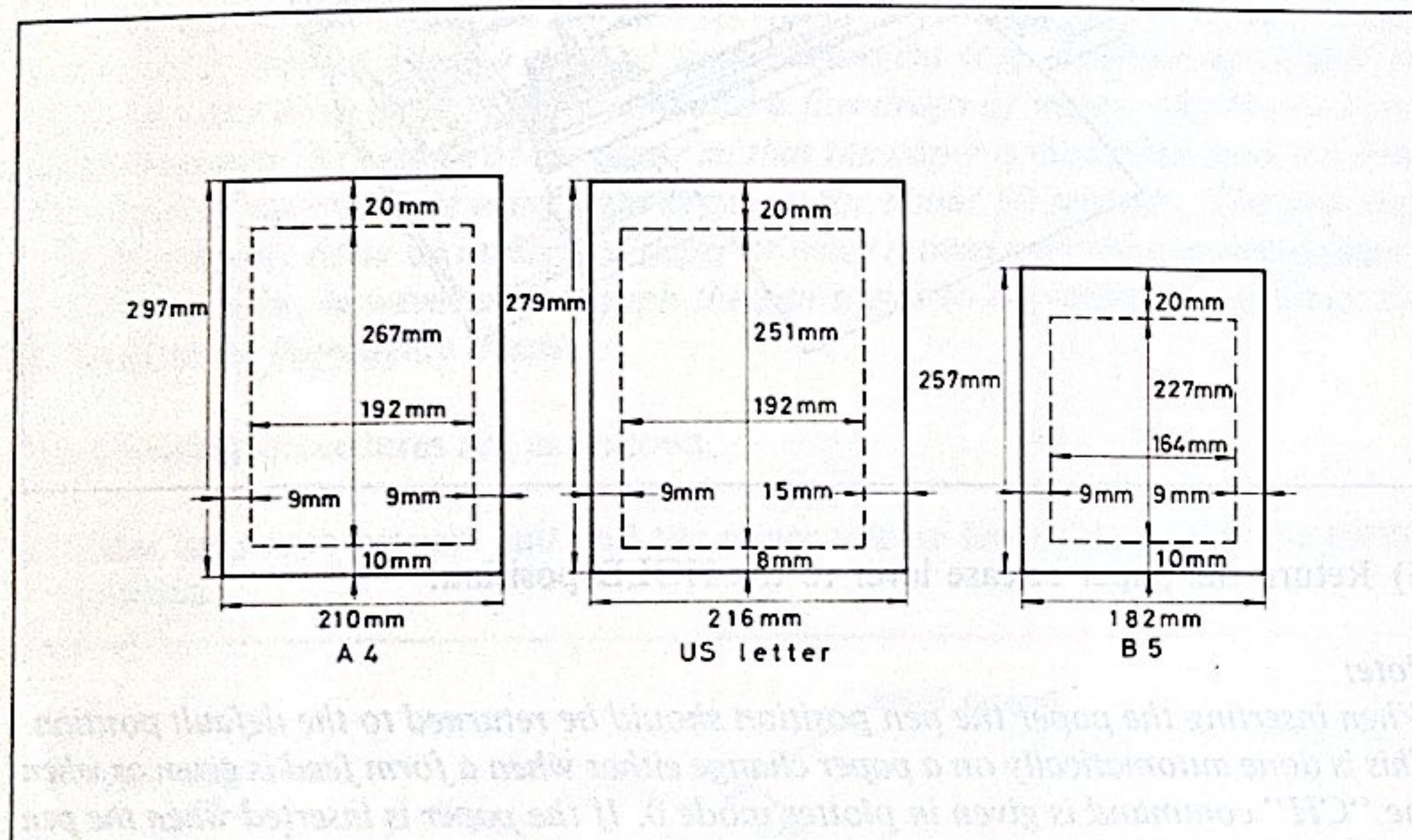
When inserting the paper the pen position should be returned to the default position. This is done automatically on a paper change either when a form feed is given or when the "CH" command is given in plotter mode 0. If the paper is inserted when the pen is positioned at a coordinate which is not at the default position, the paper may be ejected when you do not expect it to because it has been moved to a position which is incompatible with the pen position. For example suppose the pen is positioned half way along the paper and the paper is then changed so that the top of the paper is positioned at the front edge mark. If a command is now given to return to an origin at the corner of the first piece of paper, the paper will be ejected from the front of the HI-80 because the paper has effectively been moved too far in that direction.

2.6 Effective Drawing Area and Coordinate System

2.6.1 Effective drawing area

The pen plots within the area of the paper, but it is possible to give commands which denote positions within a larger area. The pen will stop at the edge of the paper and treat it as a border, like a window on the larger area. It will resume plotting correctly when the specified pen position returns to a position within the window. This window is referred to as the effective drawing area. The method of stopping at the edge of the effective drawing area is known as clipping.

Paper sizes which can be used are A4, B5 and U.S. letter size. The effective drawing area for each paper size is as follows.



2.6.2 Coordinate system

The coordinate system used is as follows. The X axis corresponds to the direction of paper movement and the Y axis corresponds to the direction of pen carriage movement. The coordinate origin is set to the point at which pen 1 is positioned after initialization. A more detailed explanation of the use of coordinates is given in section 3.2.

2.7 Removing Paper

Pull the paper release lever forward to the FREE position, then remove the paper from the front paper inlet or top paper outlet.

Note:

The pen will remain on the paper for two seconds after drawing the last line. If you try to remove the paper before the pen is raised, a line will be drawn across the paper as you pull the paper out. Wait until you hear the pen rise off the paper.

Chapter 3 GENERAL POINTS IN USING THE HI-80

3.1 Plotter and Printer Modes

The HI-80 is primarily a plotter, i.e. it produces graphic output rather than text, by moving the pen under software control. However, it can also produce text as if it were a printer. It has two plotter modes. Mode 0 is an extended plotter mode. Mode 1 is a basic plotter mode which is compatible with the commands used on the WATANABE (Graphtech Myplot II).

3.1.1 Plotter mode 0

In this mode it is possible to move the pen to produce lines and circles, to make bar charts and pie charts and other graphs. It can also produce smooth curves from a limited number of points.

It is also possible to use extra commands to print text with the graphics. Download (user defined) characters can be printed, provided optional RAM is added to the plotter.

Mode 0 uses double-letter commands.

✓ 3.1.2 Plotter mode 1

In this mode only a limited number of the mode 0 commands can be used. The more sophisticated commands such as those for plotting circles and producing graphs in their various forms require software in the computer to generate them. It is also possible to print text with graphics, although not as powerfully as in mode 0. It is not possible to print download characters in this mode.

Mode 1 uses single letter commands.

3.1.3 Printer mode

In this mode the HI-80 behaves as if it were a printer. All characters are drawn using movements of the pen. Many variations are possible in order to print text using various typefaces and styles. Download characters can also be used. The text output to the HI-80 in printer mode can also be added to graphics output created in one of the plotter modes.

3.1.4 Self test mode

The HI-80 has the facility to check the control and mechanism functions, and the drawing quality. The self test is initiated by switching the power switch on while holding down both the UP/DN and CAP/OFF switches. It produces a test pattern using different facilities of the HI-80.

NOTES:

- (1) As there is no means of detecting whether paper has been inserted, please ensure that the paper is correctly positioned BEFORE switching on in this mode. The pens will start to write soon after the power is switched on in this mode and will deposit ink on the platen. This will discolour the reverse of paper subsequently inserted into the plotter.
- (2) The test uses all four pens, so they should all be inserted if a full test pattern is to be drawn.

See color samples at the beginning of this manual for test patterns.

When an error is detected in the control circuit check, the ERROR LED will flash. No test pattern will be drawn.

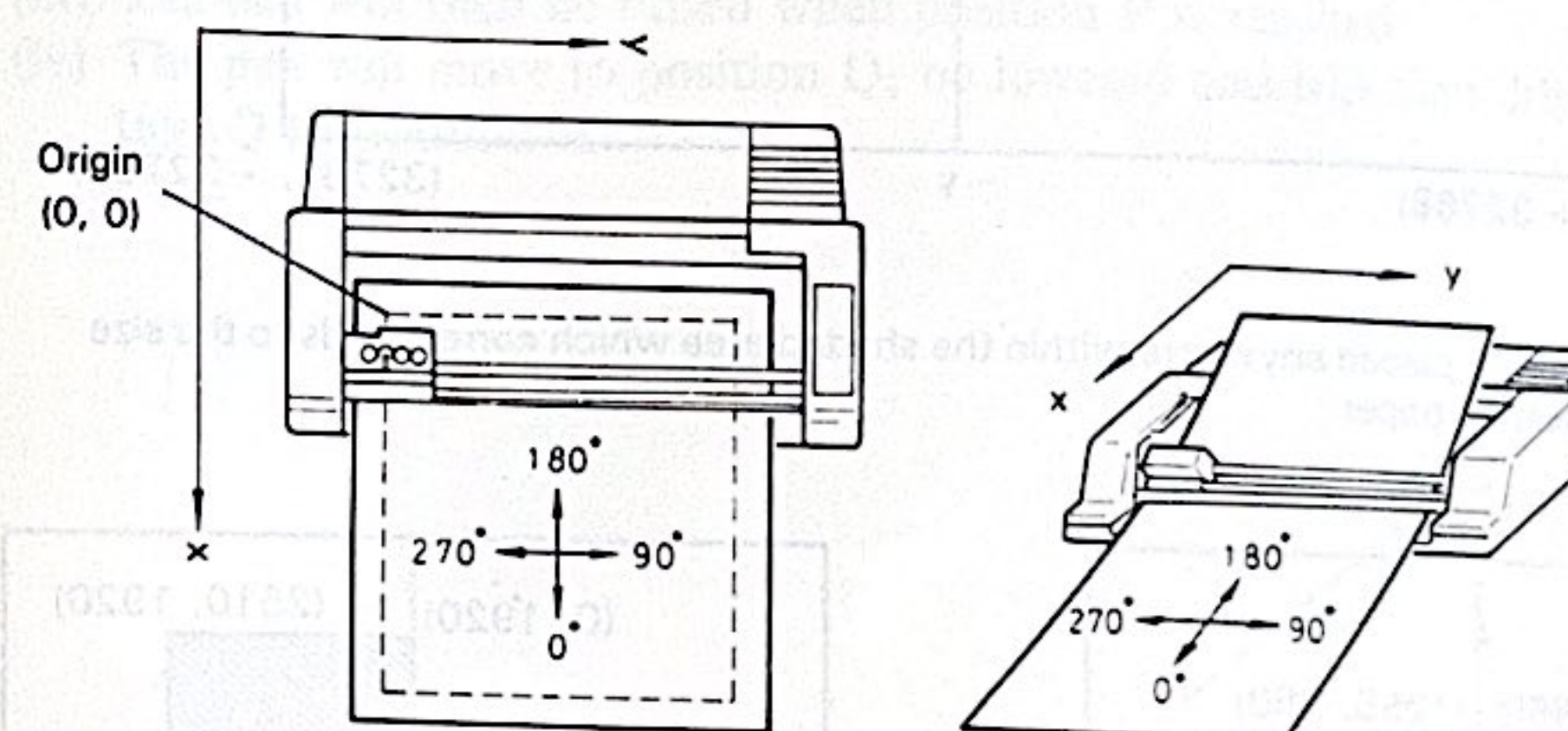
When a test diagram has been drawn, the plotter is placed in the change paper position, although the ON LINE LED will not be flashing as in a normal change paper state. If one of the POSITION switches is pressed a further pattern will be drawn.

To use the HI-80 normally in either plotter or printer mode, it must be switched off and on again.

3.2 Coordinates and General Plotter Commands

In using the plotter it is necessary to position the pen at a known place on the paper. The convention used for this is the standard Cartesian coordinate system. In this system the position of a point is given as two numbers. The first number of the pair denotes the position along the X axis, and the second in the Y axis. The convention for the HI-80 is that the Y axis is in the direction of the pen movement and the X axis at right angles to this, in the direction of the paper movement. In printer mode it is possible to set the direction of printing to be along either axis temporarily with a software command.

The ranges of the coordinates on the X and Y axes are shown in table 3-1. They depend on the size of paper used. When the printer is switched on or the default value is set the origin is at the bottom left of the paper if it is held with the X axis horizontal and the Y axis vertical.



The values of the coordinates of the plotting area are shown in the following table, for different paper sizes. The plotting area is within a border whose position on the paper is shown in section 2.6.1.

Table 3-1

Paper Size	Effective drawing size	Range for X	Range for Y
A4	267 × 192 mm	0 - 2670	0 - 1920
US letter	249 × 192 mm	0 - 2510	0 - 1920
B5	227 × 164 mm	0 - 2270	0 - 1640